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The JOURNAL *of* GEOGRAPHY

An illustrated monthly magazine devoted to the interests of
teachers of geography in Elementary,
Secondary and Normal Schools

EDITED AND PUBLISHED BY
RICHARD ELWOOD DODGE
Professor of Geography, Teachers College, New York City

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THE JOURNAL OF GEOGRAPHY

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HOME GEOGRAPHY*

BY W. M. DAVIS

Sturgis-Hooper Professor of Geology, Harvard University, Cambridge, Mass.

THE study of home geography does not find its chief recommendation in the local information that it provides, but rather in the aid that it furnishes through local examples to the general study of geography, by giving full meaning and reality to geographical facts and relationships the world over. The reason for this is that geography as a whole is hardly more than a compilation of innumerable local or home geographies. However the home geographies of different places may vary, the distant ones can always be better appreciated if the local one is consciously observed and understood as a member of the class to which it belongs.

There are certain important principles that the teacher should bear in mind during the progress of local study. Geography teaches us about the way that people live on the earth—this being a simple conversational definition of this subject, sufficing to embody in elementary form "the study of the earth in relation to man." Geography is therefore concerned with two classes of facts and with the relations in which the two classes stand. The first class embraces all necessary facts about the inorganic earth—land, water, air—and about plants and animals considered as the non-human inhabitants of the earth; the second includes the necessary facts as to the manner of man's living, from the savage to the civilized state, from wandering nomads to fixed populations, from the thieving of warfare to the competition of trade. It is only as the facts that constitute these two classes come to be understood that their relationship can be studied; and this matter of relationship then becomes the very soul of geography. The items of geographical text-books are then not merely so many absolute, empirical statements; they are examples of the relationship established in a certain region between man and his natural environment.

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In more advanced teaching, the pupil should be led to see that plants and animals as well as man respond to their environment. Geography then becomes "the study of the earth in relation to life." All the elements of controlling environment are then to be grouped under physical geography or physiography; and all the examples of organic responses make the other half of geography, which may be called ontography. There are innumerable relations within each of these divisions as well as between them. Thus the winds make the waves and the waves wear the coasts: or sheep eat grass, and man uses sheep's wool for his clothing. But in all cases, geography is concerned rather with the relations into which its facts enter than with the facts, isolated and alone.

Actual examples of geographical facts and relationships are to be seen on every hand. No teacher need be entirely dependent upon a text-book. When geographical facts are taught from text-book alone they are bereft of their natural foundation and fail to develop in a child the interest that should be aroused and that can be aroused if geography is based on personal observation.

A few suggestions follow as to what can be done in this way in an excursion covering a hill and a valley with a brook or river. In such an excursion are included many facts that deserve observational study through a large educational range, from elementary grades to the university. At first, a simple statement of directly observed facts suffices. But very soon, the nature of the facts will be better appreciated if their fuller meaning, their physiographic life is pointed out. Thus a creek comes to be recognized as a stream of water, fed directly or indirectly by rainfall, and bearing the waste of the land towards the sea. The soil on the valley slopes is rock-waste, a result of weathering and not yet washed away. The continuation of the activities that are associated with and may be studied near the brook must produce certain slow changes in the form of the valley; and it is by the long continuation of such activities in the past that the present form of the valley has been produced. With progressive weathering and washing on the two slopes of a hill, it must in time dwindle away; and the same processes acting through the past have carved the hill into its existing form. Thus not only the facts, but the nature and meaning of the facts become clear and vivid.

The features of a coast line may be treated in the same way. A part of the line may be traced and its peculiarities noted; thus the simple facts become clear. But very soon, the coast line should be treated in its true physiographic relations. It is the line where the sea borders on the land; and this line has been determined in the first place by such elevation or depression as the land has last suffered, whereby the waters came to lie upon it at a certain level, thus giving the initial shore line a certain form: second, by the activities of rivers and of the sea waves, tides, currents—which have brought about certain changes whereby the initial shore line has become the actual shore line. The ease or difficulty of understanding the present shore form is partly determined by the nature of the local example studied, but more largely by the knowledge or the lack of it on part of the teacher.

The phenomena of the weather serve admirably to develop the habit of observation, yielding a large return in facts of importance, many of which are susceptible of simple explanations, and thus it is not to the rivers and ocean alone that we must turn for observational study of geographic facts. The geographical portion of the study of animals and plants also presents interesting examples of similar healthful exercises in geography, but the limits of space forbid their consideration at this time.

It will be noticed that in the paragraphs dealing with rivers and coast lines, something of explanation is introduced. This I hold to strongly, as introducing the rational element into geography, and thus invoking the understanding to aid the memory. It is not merely for the sake of knowing how hills and valleys are made that the problem of weathering and washing is discussed; it is discussed because the facts concerning the hills and valleys of to-day, at home and abroad, can be much better appreciated if one understands how the hills and valleys have originated. There can be no question of the truth of this principle; hence I would urge on every teacher the importance of not only leading pupils to observe accessible facts, but of leading them quickly and easily to perceive the meaning of the facts observed. And with this brief consideration of the first class of geographical facts, let us turn to the second.

A village is an admirable subject for observation of human conditions. Notice the increasing closeness of the houses towards the center, around the stores and offices; note the larger open spaces about the border of the village. See how the roads converge towards it from the surrounding country. Consider the traffic on the roads, inward and outward. All of this should be taken, not merely as local fact, but as an example of a way in which some of the people of a certain country in the world live. After direct observation comes simple explanation. The post office is near the center of the village, because it there best serves general convenience. A single road leads out for a mile and then forks into two; because it is cheaper to reach two districts in this way than by two independent roads. Some of the villagers work in shops, others are employed in a bank, or at a railroad station; thus diversity of occupation is first observed, then accounted for. The growth of the village may be explained, story-fashion. Then, like the hill, it is seen to have a life-history.

As examples of the two fundamental classes of geographical facts accumulate, bring them into their relation. The site of a village has meaning in it; it is a consequence of some natural features, or group of features. In one case a village lies on an upland so as to be away from the steep-sided, narrow ravines that dissect a plateau; in another a village lies on a valley floor, because the hills are too high and too isolated to serve as convenient centers of population. Certain parts of a coast line are very thinly inhabited; these generally offer poor opportunity of embarking or coming ashore. Between many miles of such a coast a natural harbor may determine the location of a large city. Roads and railroads, fields and forests, farming and manufacturing all respond to geographical environment. From beginning to end, from the simplest and most apparent examples of relationships ready at hand for every teacher, to those most involved examples which the professional geographer is trying to clear up, the relation of man to the earth is a most alluring study.

It is sometimes said that in the schools of large cities, observational study is impossible; but this is a serious mistake. It arises from the failure to perceive that a city belongs in one of the most important sub-classes of geographical facts. Consider, for example, what may be seen on a single street. It is paved and curbed; it is lighted, watered and drained; houses are built closely along it, and they vary in size, construction and use. Remark the activities of the street; the varying stream of people, passing this way and that, crowding the sidewalks at certain hours, deserting them at others. Observe the traffic in wagons, the passengers in cars. Here is fact in abundance. This all exhibits the way in which people live at certain places, called cities, where for some reason many thousands are crowded on a small area. Why are they thus crowded? Why are some cities or villages larger or smaller than others? Is this particular city larger now than it used to be? Why is it engaged in certain kinds of trade? Through these observations and questions, the human element of geographical study is prominently brought forward, as it should be.

It is not only through the principle of likeness that home facts are useful in describing distant facts; the principle of contrast is no less helpful and important. The children of a city school may learn not only about other cities by comparison, but they may learn about smaller gatherings of population, as in villages; they may even expand their parks into a useful understanding of fields and forests by playing variations on dimensions. An excursion over a hill or across a valley may be extended to a great variety of lessons, about mountains and plains, large rivers and small, fertile regions and deserts. A winter cold snap illustrates the climate of a frigid zone; a summer hot spell exemplifies that of the torrid zone. A drought serves as a sample of an arid climate; a period of heavy rain introduces stories of the excessive rainfall of the equatorial belt.

In this extension of the local to the remote, I would urge teachers not to be too logical. Some hesitate to mention Africa until Africa has been "studied." This is too formal. Surely, no good narrator would, before telling a story to children out of school, ask if they had studied about the continent where the story is located; he might however wisely select for his scene an unstudied region, and thus make way for it. Here, as in certain other cases, the teacher may often in school imitate to advantage the informal methods that prevail out of school.

Thus the attentive cultivation of home geography, taking advantage of the many examples of the two classes of geographical facts that are spread about us, affords a natural, observational, rational basis on which the larger aspects of the study may be securely founded.

HOME GEOGRAPHY

The object of this grade's work should be to relate the conceptions already formed and new ones to be formed during the year, so that they will make a related whole in the form of a specific geographic organization, the city. The process of procedure should be much the same as will be followed later in the study of larger geographical regions. That is: we should begin with that nearest to the pupil in point of interest and at the same time the natural continuity of topics should be observed, building upon the simpler and more casual topics those more complex topics dependent upon products and civic organization. The use of maps is important. No map should be presented to the pupil which he has not already interpreted and constructed for himself. The natural horizontal direction should be used in placing the models and maps, until the child is perfectly familiar with the directions and locations on the plain, and then slowly and carefully the transposition to the usual map directions can be made, by placing them in the vertical position on the north wall and later to other positions. So far as possible a proportional size should be followed in all map construction to give the children a proper conception of relative distances.—*From the Chicago Course of Study.*

GEOGRAPHY OF MANCHURIA

Physical and Strategic.

BY N. M. FENNEMAN

Professor of Geology, University of Wisconsin, Madison, Wisconsin.

A COMPARISON of the campaign now being waged by the Japanese, with that carried on ten years ago in the war with China, leaves a very strong impression that the nature and direction of the army movements are being controlled by the surface of the country. The enemy in the former war came from the South; in this war from the North. The former enemy was weak; this one strong. Yet the movements of the opposing armies have been so nearly identical in the two cases that it has well been said that a strategic map of either war would serve to illustrate an account of the other.

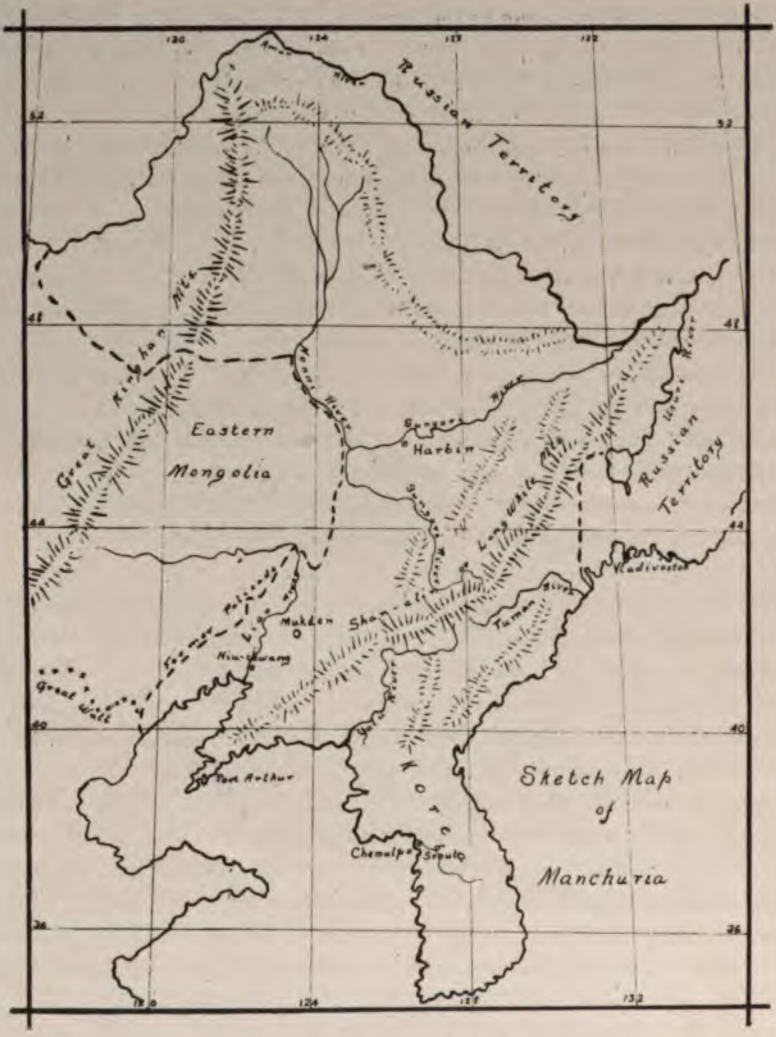
Maps. Reliable maps of Manchuria are exceedingly difficult to obtain, if, indeed, they exist at all, outside the circle of the Japanese war department. A search of a number of days for such maps revealed a hopeless confusion and endless contradiction among various authorities. An eminent American strategist has announced his decision to give up as hopeless the location on any map, of places named in the war accounts. This state of affairs gives a pathetic humor to the announcement of the Russian generals after the battle of the Shakhe river, which was to the effect that the battle had been lost for the want of accurate maps which, unfortunately for them, their enemies possessed.

Latitudes and dimensions. Manchuria is a country of large dimensions, nearly 1,000 miles long from the northernmost bend of the Amur river to the Yellow Sea on the South. The average width is nearly 400 miles, giving an area of something less than 400,000 square miles. Accuracy is not possible on account of the contradictory nature of maps with reference to the western boundary. Port Arthur on the Yellow Sea is in the latitude of Washington; Mukden in that of New York; Harbin is as far north as Montreal. This is approximately at the center of the country, so that the northern boundary reaches the latitude of the southern part of Hudson Bay. Vladivostok is in the latitude of Boston, though, to complete the scheme of analogy with American cities, Boston should be some 200 miles farther east.

Climate. These locations at once suggest a large range of climates. In general it may be said that the climate of Manchuria is colder than that which is found in like latitudes in Europe and North America. For the southern part of the area this difference is not great, but in going north the departure of the mean annual temperature from the average of this latitude is intensified by the unusual cold of the winters. The climate is markedly of the continental type, and therefore subject to great extremes. With summers slightly warmer than the normal for this latitude, the winters, even at Harbin, are some 36 degrees colder than the normal. This gives to the valley of the Sungari river a winter temperature similar to that of southern Greenland. The valley of the Amur, as might be expected, is still colder. In New York and adjacent states the difference between January and July average temperatures is for the most part less than 50 degrees. At Mukden the corresponding difference is 70 degrees, and the difference increases northward to 90 degrees on the Amur river. However, lest it should be supposed that these low winter temperatures indicate a typical Arctic climate, it should be remembered that vegetation depends primarily upon the nature of the growing season and not upon the character of the intervening winters.

The winds of Manchuria, unfortunately, come from the North or Northwest in winter, and from the South or Southeast in summer. In addition to the effect which this has upon extremes of temperature, it exercises a dominant influence upon the distribution of precipitation. The winters are dry; the summer monsoons bring drenching rains. Forty-five days of continuous rain have been known in the valley of the Usuri, an amount sufficient to rot European crops cultivated in European style. It is said, however, that the natives have adapted their agriculture to the peculiar conditions and there is apparently no reason why the broad valleys tributary to the Sungari should not become an agricultural country of great wealth.

Topography. The dominant features of the topography are indicated by the direction of two lofty mountain ranges, the great Kinghan on the northwest, and the Shan-alin or Long White Mountains on the southeast. The latter extends northeast to the Amur and Usuri rivers. At its southwest end, 900 miles away, it dies out in the rugged hills of the Liao-tung peninsula. Probably both of the ranges named are much broader and more complex in their alignment than is indicated upon the very sketchy maps available. On the north side, roughly parallel to the Amur river, but lying south of its broad valley, forming the water-shed between the Amur on the north and the Nonni and Sungari and their tributaries on the south, is a tranverse range with altitudes from 3,000 to 5,000 feet. West of the Liao river is a small range along which the present boundary of southernmost Manchuria is drawn. Between the mountains thus outlined are the broad, comparatively level and seemingly highly fertile valleys of the Nonni in the extreme north, the Sungari and its other tributaries in the center, and the Liao in the south. For long distances within this territory, these valleys lie less than 600 feet above sea level. Even the low divide between the Sungari and the Liao is a gently rolling upland of moderate elevation. There is nothing in the nature of the valleys thus outlined to prevent the marching of an army from the shores of the Yellow Sea to the upper Nonni river, several hundred miles north of Harbin.



Forest and Prairie. The mountains and adjacent hilly country, comprising one-half or probably more than one-half the entire area of the country, are well wooded. The valleys are prairies. It is said, upon the authority of Prince Kropotkin, that the prairies of the Amur river are covered in the spring with grass and flowers to a height of four or five feet, and there is apparently equally good authority (Reclus) for the statement that the prairies of the Sungari valley are clothed with grass from eight to ten feet deep, though it is not improbable that this statement applies to the best of the prairies rather than to the average.

Population. This northern area, seemingly so fertile, and so full of promise for the future, is almost uninhabited. The country south of Harbin, and especially the valley of the Liao river, is fairly densely populated, the latter supporting perhaps its full quota of human beings. It is said that the population of southern Manchuria, which extends essentially to the divide between the Liao and the Sungari, is about 12,000,000 people, though statements vary widely. For the remaining four-fifths of the country there seem to be less than 8,000,000 inhabitants.

Unsatisfactory boundaries. This country of less than 400,000 square miles has 2,500 miles of frontier against Russian territory. The Amur river, running through a broad and fertile lowland, nominally divides that lowland politically into two parts, Russian on the north and Chinese on the south. To those who are familiar with the history of boundary lines, such a division carries the suggestion of extreme weakness. Modern civilization has found out, as some one has said, that rivers are the diameters of communities, and not their circumferences; that trade, and with it all the rest of modern life, gravitates toward the rivers, and there mingles and thereby unifies the life of the country on both sides. Should the country along the Amur become well peopled and civilized, it would seem as impossible to preserve one sovereignty on the north and another on the south as it was to keep the Rhine river German on the one side and French on the other. Or, again, it would seem that the difficulty of maintaining separate sovereignties on the north and south sides of the Amur would be found no smaller than that of erecting separate sovereignties on the north and south sides of the Ohio and Potomac rivers. Rivers may make very good boundary lines between purely administrative divisions, such as counties within a state, or even, in so strong a central government as the United States, between states, where a man may go down to the river bank and cross without any experience to show that a new political division has been entered. But between independent, sovereign and possibly hostile countries, while temporary barriers in times of war, navigable rivers are fatal to continued separation in times of peace.

The boundary between Manchuria and the Russian possessions on the east is fixed at the Usuri river. All the disadvantages which must some day be felt in connection with the Amur boundary on the north must here be duplicated. The Usuri valley is already a highway for Russian trade and armies. On the southeast, Korea is separated from Manchuria by the Tuman river and the Yalu. Transgressions of this boundary afforded the final provocation and immediate occasion for both of Japan's great wars, the one with China, the other with Russia. The causes of these aggressions lay in the natural tendencies of trade. With anything like powerful sovereignties on opposite sides of this boundary line, the Yalu river would make about as good a frontier for Korea as the Po river would for Italy. The natural frontier of Korea is the Shan-alin mountains, just as the Alps are the natural boundary for Italy. On the west, Manchuria is separated from eastern Mongolia by a purely artificial and invisible line, except at the southernmost end, where the line follows the low ridge mentioned above. The entire boundary of southern Manchuria was for several centuries marked by a wooden palisade, but that has totally disappeared except for occasional widely separated ruins.

Natural boundaries. If a civilization is to grow up in Manchuria with reasonable hopes of stability and peace, it will doubtless be found necessary to rectify these boundary lines in some manner so as to separate adjacent sovereignties along natural lines. It will probably always be found impossible to retain much political or commercial unity between central Manchuria and that part lying west of the Great Kinghan mountains. It would probably be a gain to the country rather than a loss if it should be relieved of the care of that remote portion of its territory. Similarly on the north, if the Russian is to occupy the northern bank of the Amur river, he might as well occupy the southern side, having his frontiers along the low mountain range which forms the divide between the Amur on the one side and the Nonni and Sungari on the other. This would leave to Russian domination the well unified and naturally delimited valley of the Amur. To Manchuria it would leave the equally well unified basin of the Sungari, and all its tributaries. Should the Russians retain control, as no doubt they will, of the country east of the Usuri river, it might well be found to the advantage of both countries to correct the boundary line by establishing it along the line of the Long White mountains. On the west, it is highly desirable that any sovereign state which may occupy Manchuria should extend its frontiers to the Great Kinghan mountains.

Coast line. The coast of Manchuria is not very different from the coast of Scotland or that of Maine. It is that of a well dissected country of strong relief, partially submerged. The peninsula of Liao-tung, at the end of which Port Arthur stands, is but the low continuation of the Long White mountains. Such a coast is characteristically rich in harbors. The

Japanese found it easy to effect landings at fifteen or twenty different points in the present war. It is therefore a very easy coast to invade, but for reasons similar to those which have made the good harbors, it is a very difficult coast to subdue or conquer. Port Arthur is a natural basin in a mountainous upland, submerged beneath the waters of the Yellow Sea. The knobs of subdued mountains surround it on its landward side in a way now familiar to all, making a natural fortress of peculiar strength.

Routes of invasion. If the routes followed by the army of invasion be examined, they will be found to have a very close dependence upon the geography here sketched. The initial landing of troops was on the west side of Korea. From this point the comparatively low country was followed to the Yalu river. Considerable resistance was met at this point and a notable battle fought in which it has been said that the Russians occupied the exact heights which were fortified by the Chinese ten years ago, were deceived by the same ruses and went down before the same attacks, coming from the same direction. They then retreated northwestward toward Feng Wang Cheng by the same road followed by the Chinese. At Feng Wang Cheng the road sends out various branches in westerly directions. This place, though a center of travel, was not chosen to be defended, probably because of better opportunities at the passes to the west and northwest. It is here, along the southwestward extension of the Long White mountains leading down to the peninsula of Liao-tung, that a long delay occurred. It was at first reported that the passes of the mountains to the west and northwest were unfortified, and it was supposed that the Japanese were marching without opposition toward Mukden on the north and Hai-tcheng and Niuchwang on the west. Here, however, the natural strategic features of the country came into prominence by a long delay occupied with repeated skirmishes and stubborn fights between comparatively small armies. Despite the earliest reports which gave to the Japanese an unimpeded passage over the low range, it was four long months before the passage was effectually made, and Motien and Daling passes have repeated mention as the scenes of hard fighting until after the battles of Liao Yang and the Shakhe river. This low mountain range safely passed, the complete occupation of the open valley reaching south and north from Mukden was largely a matter of fighting strength, and it would seem to a layman, of geographic rather than strategic interests, that the steady progress of the Japanese northward to Harbin, or of the Russians southward to near Port Arthur, is a matter of hard and skillful fighting rather than of strategic questions based on topography.

OBSERVATIONAL WORK FOR CHILDREN*

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IN this country observational work for children is a matter of theory rather than practice. However much teachers who are particularly interested in geography may be gratified with the "new geography," they can but lament the lagging of this very important side of the subject. And its importance does not end with the study with which it is connected; it touches much of the whole primary programme, besides being an asset in the grammar and high school work of the student. When teachers and school directors appreciate this fact, observational work will be insisted upon, whereas its practice is now largely a matter of sufferance.

The advantages to children of this method of study must be real and obvious if school superintendents are to indorse it; the men who are responsible for the efficiency of our elementary and grammar school work have delicate adjustments to make in their present crowded schedules. The simple school programme of our fathers has been variegated and expanded quite to its maximum. Nevertheless the problem of the present in the elementary grades is one of correlation not retrenchment; little sacrifice should be made in variety of training, but careful attention should be given to the matter of useless duplication of work, and to dissipating the energy of pupils. Whatever means give promise of minimizing these two conditions should be well considered, if not empirically investigated.

But before we can see observational work in operation in many school systems of even moderate size, we must have a changed attitude in either one or both of two educational exponents, the grade teachers and the superintendents of these systems. When enough of the teachers in a system of schools become convinced that this side of geography work is worth while, without doubt their wishes will be respected by their superintendents; or when the superintendent is satisfied with the wisdom of thus investing time and energy his teachers will be pleased to coöperate. It is certain, however, that while superintendents in general indorse the observational phase of geography teaching, they demur on the ground that they can not find a place for it, or that their teachers do not succeed with groups of children out of the class room; other reasons have been stated to the writer, but these two are most frequently given. The first objection disappears with the conviction that the work gives educational returns; the second is a premature conclusion due to conditions which we will consider in another connection.

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* Read before the Educational Section of the Eighth International Geographic Congress.

Another objection less commonly urged, but much more pertinent, is the teachers' lack of training for carrying on observational work with their classes; and few superintendents have been able to give the subject very special attention. Preparation for the work on the part of the teacher is to be desired; with the wide-awake teacher this lack of preparation is not a formidable objection. The numerous, and still increasing number of summer schools ought to give an opportunity for the hesitating teacher to acquire the confidence needed. Indeed a great deal might be done by our State departments through the Institutes, city and county.

Nevertheless the hesitation which teachers have in reference to taking up observational work with their classes is for the present an important consideration. This hesitation is due in part, as just stated, to a lack of special training; to timidity in managing children in the field; and also to want of time. The removal of the first cause rests with the teacher; suggestions for this work may be found in books, in current educational literature, and in published courses of study; an investigation of the home locality, physical features, manufacturing and commercial interests, will show the extent to which these suggestions may be applied, and may also reveal many possibilities entirely local. The second cause comes either from expecting too much of children, or from too brief an experience with them in the open; it must be remembered that the novelty of the situation has an exuberant effect on the youngsters the first time or two in the field; anyhow it would be exceedingly depressing to find pupils taking out into the sunlight and exhilarating atmosphere their in-door decorum; as teachers perhaps we should if necessary cultivate an adaptability to juvenile out-door feelings. More serious in its bearing on the problem is the lack of time; every lesson in observational work should be prepared thoroughly; for the novice this means much extra effort the first year at least; furthermore if the trips are taken the last period of the afternoon session, as may be done for the nearby excursions with least inconvenience to the programme, that half-day's work may be lengthened some; no enthusiastic teacher will find it very discommoding to give this additional time to the progress of her classes.

This increased tax on the teacher, however, has its compensation. She becomes more efficient even in the estimation of children who appreciate freshness of information, freedom from books; this feeling of pupils in the primary grades is akin to that of high school or college students for instructors who are also investigators. On the other hand of far greater importance is the teacher's growth in intrinsic efficiency. As teachers we learn much from books, lectures, etc.; but this learning does not insure teaching success, it may make possible a dangerous kind of mental stagnation. The teacher who, year after year is an inspiration to pupils, keeps in touch with more than text-books; one source of such inspiration is the field study necessitated by observational work.

SOME DETAILS CONCERNING OBSERVATIONAL WORK

For obvious reasons the number of pupils usually allotted to each teacher in the grades is more unwieldy, from the standpoint of good work, out of doors than in-doors. Under ordinary circumstances twenty pupils should be the maximum number for observational work. Best results, therefore, follow making each trip in two sections, the substitute or practice teacher taking charge of the section left at their desks. No other part of the work, preparation or discussion, needs to be thus duplicated. If proper ideas prevailed among the supporters of our public schools this repetition would not be required; a teacher should never have more than twenty pupils. Under our present system the Batavia method of having two teachers for each room loans itself easily to this division for out-door work.

To be most effective observational work must be a regular part of the programme. All teachers who have tried out-door exercises understand that for the first time or two the children do not get entirely away from the picnic or frolic idea. Again, the repeated appearance on our streets or in the parks of a teacher and her group of pupils will shortly educate the general public out of its present glaring wonderment; we lament that in the minds of so large a portion of the American public, education means the elimination of first-hand knowledge. A regular time at stated intervals for the observational work will place it in the child's mind on a par with his other school duties. One or two trips in a season have little more value as an aid in geography than has any other outing.

All out-door exercises should be preceded by a class-room consideration of the chief features of the trip. If a factory is to be visited, ascertain in this discussion what any of the children know of the raw materials used, of the methods employed, of the products, etc. This particular factory may mean food and clothing to some of the pupils; their parents may be operators, or otherwise connected with the plant. Suppose you plan a field study of soil, or that you are to visit a garden, a nursery, or a farm; pupils in even the lowest grades can contribute some information to a preparatory discussion of these topics. It is a trite expression that we never know a subject till we teach it; in a similar manner the child is made stronger by imparting information to his class room companions. An anticipatory interest should figure in all observational work.

Children on these field trips should be directed in reference to points intended for their note books; it has sometimes been thought best to have the notes taken by every third or fourth pupil, all using these notes later in the class room. In the advanced primary and in the grammar grades each child should make field notes. In general pupils from the elementary schools are more spontaneous in their questions than are high school or even more advanced students. Possibly this fact is true of children because they have not reached the point of self-consciousness that dreads putting a question which may reveal even excusable ignorance. This inquiring spirit necessitates the wisdom of the teacher's suggesting the particular topics she would have the class enter in their record of the trip.

Having made the trip, then should follow at the next geography period a further discussion, broader and more thorough than the preparatory consideration; in this the children themselves should take the major part; to the former the teacher contributed much. This summing up of the trip should be followed by a written report; the composing of this report is language work, differing possibly from the regular language work in having more spontaneity. A record of the trip should be made by each pupil, the disconnected sentences of the lower grades having as much educational value as the more pretentious compositions of the older children.

GENERAL SUGGESTIONS

If a scheme of observational study has yet been worked out and tried, the writer does not know the fact; in several places work has been undertaken with one or more grades; but the real test of this as of any other educational effort is its graduated application to a complete course of primary study. Evidently such a scheme would be a matter of particular rather than general development. The size of the city or village, the economic and agricultural environment, the transportation facilities, the physiographic surroundings, the length of the open or field season, are factors that must figure in the order and nature of the work undertaken.

Nevertheless there are in almost every locality some basal phenomena which may be considered: where men are congregated, stores or markets exist; each region has its own products which seldom have a range equal to the necessities and luxuries used, therefore these stores and markets illustrate the products of other regions; weathering is universal, consequently the genesis of soils is a general topic; wherever there is rainfall the action of running water may be observed; rare indeed are the places from which some products, food or manufactured or raw material, are not distributed, the shipping station thus bringing the child in touch with the necessities or luxuries of his more distant fellows; a building in process of construction centralizes materials otherwise disconnected, and brings them together too in a lesson that makes instant appeal to the child; even in the humid climate which characterizes the sections of our country most thickly populated there are occasional seasons of drought when we may observe the early stages of a region becoming arid, the grasses first succumbing to the want of moisture, the higher plant forms following.

While concrete illustrations and lessons must always be characteristic of observational work, it should not be approached with the idea that the particular investigation carried on with children is an end in itself; this work has in common with every study connected with nature, or with the interaction of man and nature, an inspiring culture value. The information which children get out of the work is not of chief importance; the discernment it gives them in the relation of controlling influences is of greater value.

And yet we question whether observational work as thus outlined would deserve a place in the primary programme if it concerned geography alone; such work requires time in itself, time in supervision, time in preparation on the part of the teacher. The outlay does not warrant the investment if a single study, geography, is to receive the income. The fact that it is a profit-sharing scheme will be the reason for observational work eventually having a fixed place in school curricula. History, language work, arithmetic, drawing, and the pre-high-school observational sciences, all may be enlivened through this out-door geography study.

The correlation of the activities of men makes history; the trend given these activities by the earth is the more essential side of geography. Naturally then there is great variance between localities in their richness in the joint field illustrations of these two studies. We may feel that our city or town was founded so recently that it has little local history. But let the class visit the oldest building; among other queries occasioned by this place of historic interest arises the reason for its location; the explanation may or may not account also for the town's location. The child should early understand that centers of population are not of accidental distribution. Again, a trip to a flour mill affords the right opportunity for fixing the history of the shifting of the milling industry in this country. Some facts connected with the history of railroads will be more to the point after the children have inspected a freight house, noting what is being shipped and received, the cars of various companies, etc. If your region is one rich in historic associations, so much the better; strategic points in colonization or in war are seldom divorced from geographic causes.

We have already referred to the correlation of this observational work and language study. Children, no less than their elders, experience a minimum of inconvenience in reproducing what they know at first-hand; it is the attempt to rehash that inspires the feeling of repressive vacuity.

The alert teacher will be pleased with the number of live problems and computations these excursions suggest for the arithmetic period. The zest with which children handle this number work prompts many reflections in regard to the years pupils are made to study text-book arithmetic.

Sketching should be a part of the note-taking in much of the field work; sometimes this drawing in the field should be done with care, as carefully as out-door working will permit; frequently, however, a rough field sketch with indicated measurements, etc., may be reduced to greater accuracy during the regular period for drawing.

It is needless to comment on the best place for studying plants, birds, insects, animals. A field trip with children given entirely to geography is like a train trip on which the passenger sees only the interior architecture of the car. One of the objections to this work with juveniles, it has been urged to the writer, is that children see too much; this gratifying condition invites manipulation rather than suppression; it is always easier to direct a situation than to create it. This phase of geography teaching is therefore common ground for most of the primary programme; its correlation possibilities are obvious; its practice is invariably indorsed by the children, who often are wiser than we allow them to be.

SUMMARY

1. In general the superintendents and teachers of to-day do not fully appreciate the value of observational work.
2. Reasons for the teachers' attitude:
   a. Lack of preparation, a condition which the ambitious teacher can remove.
   b. Dread of conducting parties of children, a feeling which will be removed by practice.
   c. Lack of time, a fact which may be propitiated by further sacrifice, with assured returns.
3. To be most effective, this work should have a fixed place in school curricula.
4. Details:
   a. Class-room consideration of the essential features of each trip should precede the trip.
   b. Teacher should make suggestions of the points intended for note-books.
   c. Further class-room discussion should precede a preparation of the written report.
5. While local conditions will tend to shape the field work undertaken, nevertheless some trips are common to almost every region.
6. Observational work is seldom an end in itself.
7. This work apparently has in it many possibilities in the correlation of studies.

FIELD WORK IN THE ELEMENTARY SCHOOL *

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IT is a recognized law that an organism develops through satisfying its needs and that it assimilates only that which it requires for its growth. If, however, the proper stimulus is lacking, or reaction to the stimulus is inhibited, growth ceases and the organism becomes atrophied.

Since this law holds good in the realm of intellect as well as in that of the physical being, the knowledge of the reaction of the child's activities to natural and social stimuli would form the most valuable contribution to human acquirement, since it would enable education to take its place in a parliament with physics, chemistry and the other natural sciences.

However humiliating to the teaching force the fact may be, the statement remains undisputed, that the science of education, which is the greatest of all sciences since it deals with the human soul, has lagged far behind the others in its development.

A few principles relating to the scientific process in education have been discovered and formulated but they have not been the controlling factors in the warp and woof of the educational fabric. With the principle ringing in our ears—Mental activity is dependent upon self experience, we proceed to make schools which successfully inhibit the child's gaining new experiences, confining him to the experiences of others; after years of study of texts his enthusiasm for learning may frequently be represented by an inverse ratio to his scholastic experience.

When we contemplate the task the school formerly set itself, that of perpetuating book lore, we are not surprised when we read the sign, written in invisible letters, upon the façade of almost every school house, "A Refined Cramming Industry, Limited."

Knowledge has accumulated with such prodigious rapidity that the school now cries out in despair, "The task is Herculean, it is impossible!" Even if it were possible to stretch the elastic memory until it could retain all known facts the result would be deplorable. Although one may be able to repeat volumes of the world's richest knowledge, it has no meaning to the individual unless assimilated by self-experience. Character is not made by repeating what the wise and good have said, but by one's doing something wise and good on one's own account. After a few years of the cramming process the student becomes a slave to second-hand experiences. He is helpless when confronted by a new situation without the sustaining

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* Read before Educational Section of Eighth International Geographic Congress.

crutch of the text-book. The individual loses the power of initiative, independence, vigor and integrity of mental action. We are beginning to discover that we have made knowledge the end instead of the means of reaching our goal. To give the individual control of all of his powers, to bring him to a realization of his highest possibilities, should be the aim of the school, not the acquisition of facts. This can not be accomplished by the use of text-books alone.

Before our population was so largely urbanized, the child gained possession of his powers by first hand contact with nature and by participation in the industrial activities of the home. Now the school must assume the responsibility of the industrial training once given in the home. To this end our schools are slowly introducing cooking, sewing, weaving, work in wood, clay and metal, gardening and field work.

Contact with material furnished by nature engenders a certain mental activity which the mere observation of conditions fails to satisfy. This need we term a problem, and it is to the mind what appetite is to the body; it determines the food necessary for growth; it focuses the energy toward a definite end; it directs attention and observation for the collection of data, from nature, books, people and cultural products; it calls the imagination into play in forming hypotheses and, if properly utilized, tests the hypotheses by experiment, selecting relevant material, discarding the irrelevant until a conclusion is reached which bears the test of reason.

In organized mental activity the individual finds the highest pleasure. The student who is given opportunity for the exercise of all his powers from his entrance into school needs no price, per cent., nor degrees to stimulate him to action. The reward is in the joy of the doing.

It is only through the solution of the student's own problem that he gains true intellectual development. The power of imagination, reason, observation, memory, can not be developed except by the presentation of conditions which stimulate mental activity in connection with the mind's own normal movement. It is true that the mind may be trained to tricks of memory or observation, but it has been shown that this acrobatic mental skill does not go over into the intellectual power of the individual.

Field work offers an opportunity for such individual development. Every region is rich in problems for the student from the kindergarten age to the adult. Even the six year old has a problem when he makes an excursion to the farm to see how the farmer overcomes difficulties in tilling his crops and tending his stock. In his own little garden the seeds may be planted by hand, tilled with a hoe; but the farmer must devise other methods for his larger work.

Excursion to the sea shore or lake shore, to a river, to sand dunes, to a mountain, volcano, swamp, to regions where glacial phenomena are illustrated, to caves, quarries or mines, will furnish physiographic problems for pupils above the fifth grade and bring the younger children in first hand contact with natural objects in their normal setting.

Few localities can boast of all these geographic examples, but many may be found within a radius of from fifteen to thirty miles from any school.

Many of the world's important industrial activities, such as farming, lumbering, grazing, fishing, mining, manufacturing, quarrying, building, trading, and others, may be seen within the same radius.

Through visits to the accessible industries the student gains an appreciation of the cultural products of the earth. Greater returns may be expected from a single visit to a certain industry if the students are engaged in the same activity at school or at home.

It is rare that a physiographic area is so simple that one visit may exhaust its possibilities. When changes are taking place with a noticeable rapidity, as at the seashore, in the river valley, or at the sand dunes, visits from year to year give the dynamic conception of the mobile crust of the earth.

Young children form definite images through many contacts with the same material, and they retain definite images but a comparatively short time. Hence they require many and frequent excursions.

Children younger than ten or eleven years of age are interested principally in collecting material—in the activity itself, rather than in causal relations, although the important aspect of cause is not excluded from their wide range of investigation of the wonders with which they find themselves surrounded. Interest in the relations of things can rarely be sustained for sufficient time to test an hypothesis. But after about the eleventh year the causal relation makes a stronger appeal to them and about the age of thirteen or fourteen the student shows much interest in pure abstract thinking.

Interest in physiographic processes may be manifest in a certain degree as a result of field work in any of the grades of the elementary school, yet it is in no sense a dominant factor until the upper grades are reached. Here interest in the problem will carry the student through a series of experiments with running water, waves, air currents, and other forces, testing his hypothesis to ascertain the cause of observed phenomena and will also lead him to search books for farther data which may contribute to the solution.

The benefit of the excursion is not exclusively intellectual. It is useless perhaps to mention the physical advantage of exercise in open air since this is self-evident. But the social relation of teacher and pupil and of the pupils with each other is so normal and natural, free from the artificial conditions which per force of circumstances must obtain in even the most natural schools, that the teacher has an opportunity to reach the real child too often screened in the school room.

Admitting the desirability and necessity of changing the center of gravity of our school system from the slavish study of the text-book to a study of the environment, with all its activities, which requires for its understanding knowledge of other times and distant climes, the task at present is a difficult one. In the first place the change of standpoint is so recent that teachers, themselves reared for the most part on the text-book plan, are illy prepared for any other work. Where there is an attempt to carry out a new ideal, the community, always conservative, wishing to cling to traditions, frequently puts obstructions in the path of the aspiring teacher. This difficulty may be removed by educating the community through the children and through parents' meetings. The *expense* which is necessarily attendant upon field work is also a matter of grave consideration in most regions. We spend money readily upon the things for which we have a habit of spending, but hesitate when a new expense is incurred. When field work becomes customary either the parents or the school trustees will defray the expense, just as they do for every other feature of our school system which is considered essential.

Another difficulty results from the large numbers of children for which each teacher must under present conditions be responsible. The physical care of fifty children on an excursion is no small responsibility. An extra teacher is a necessity in each school building to aid the regular teacher on her excursions or to attend to half the students during her absence. With care accidents are rare. In sixteen years' experience in the field with many hundreds of children I have never known of a single accident during an excursion. Large classes are not desirable in field work, nor in the class room, yet they are not prohibitive. The individual must suffer in collective treatment in the field as well as in the school room. But the field with its numerous aspects gives opportunity for satisfying interests of each individual which the school room frequently denies. The interest manifested by a class in the discussion of a field trip leaves little doubt of the superior vitality of knowledge gained from self-experience compared with second-handed information.

The organization of the elementary school in this country is far more favorable to making field excursions an integral part of its work than is that of the high school. The departmental teaching in the secondary school makes it next to impossible with the attitude of the teachers of the special subjects to have excursions except after school hours or on Saturdays. This puts the field work at a disadvantage, but in the elementary school the teacher is mistress of the situation. Although Pestalozzi introduced field work into his geography teaching at Yverdon, Switzerland, a hundred years ago, the schools of this country have been slow in realizing its value—in recognizing that it is fundamental to all true geography teaching.

DISTRIBUTION OF THE CINCHONA TREE

Mr. J. Dronke, in his monograph on the transplanting of this plant from its native home in South America to Asia, gives some interesting facts concerning its present distribution. The habitat of the cinchona is between 10° North and 22° South latitude in the Andes and among the coastal mountains of Venezuela and Colombia. The upper limits of its range are, according to the species of the tree, from 800 to 3,000 metres. The first attempt to transplant it was in 1850, when it was taken to Algeria, with poor success. In 1854, Mr. Hasskarl, for the Dutch government, introduced young trees and seeds into Western Java. It was found to thrive finely in well-watered regions between 1,500 and 1,700 metres above the sea, and with an average temperature of about 17° (62° Fahr.). When it was discovered that *Cinchona Calisayæ var. Ledgeriana* supplied the most valuable medicinal product the cultivation was confined to this species.

The cinchona industry rapidly developed in Java, and that island now far surpasses all other lands in the quantity of quinine produced. Eighty per cent. of the world's product comes from Java, and the plantations cover 20,000 acres. The tree was introduced into Southern India in 1861; but though it thrives there it has in recent years been neglected, on account of the decreased price of cinchona bark, so that in 1899 the plantations covered only about 5,000 acres. It was taken into Northern India along the southern slopes of the Himalayas, and in Sikkim, but its cultivation there has not been important. The production of cinchona bark in Ceylon steadily grew for twenty years after its introduction in 1861. In 1881 the island was one of the greatest sources of supply. In the following ten years, however, the production greatly declined, and fell from over 15,000,000 to 510,462 pounds. Other attempts to introduce the plant into Asia, Africa and Australia have not met with success.—*Bull. Am. Geog. Soc.*, November, 1904.

PHYSIOGRAPHY IN THE UNIVERSITY *

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PHYSIOGRAPHY in this paper means morphology of the land. This is confessedly a narrow limitation of the subject, but within the time and space allowed I shall be able to discuss only this phase of the general subject.

The discussion will relate chiefly to undergraduate work in the University and to work also that may be elected by the average freshman.

Under existing conditions freshmen enter the University with very little special training for physiographic work. Some of them may have taken courses in physical geography in the High School, but in many cases they receive very little training for further work in physiography as a science. Even when the New Physical Geography is taught and where the latest textbooks are used, the work is too often theoretical rather than scientific, developing a tendency toward attempted explanation of phenomena by deductive rather than by inductive means.

Physiography, or the study of land form is a natural history subject—one of the members of a large group of subjects closely related in character. In order to attain the best results from the study of any one of them, it should be studied by the methods that have been shown to be best adapted to the members of the group as a whole. Physiography, as the youngest member of the group and the latest to claim recognition as a subject of educational and disciplinary value, should look to its older sisters for suggestions.

The study of land form is as wholly a matter of observation as is that of a grasshopper, crawfish or frog. In each, the facts of form and structure, the relation of parts, and progressive change are the things that are subject to observation. In each, the results of study are the same:—well developed habits of observation, training in the grouping and comparing of facts, and the drawing of conclusions based wholly on the facts.

The objects sought and the methods of attaining them are of the same kind in physiography as in biology. Animals are studied in the laboratory, especially by freshmen with the object of determining the facts, not to illustrate a theory. Land form also should be studied at first merely as fact. Its details must be seen, recorded, grouped and compared just as facts are treated in the biological laboratory. In the study of an animal in the laboratory, however, merely looking at the animal is not considered sufficient. Mere sense of sight must be enforced by drawings, the proper execution of

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* Read before the Educational Section of the Eighth International Geographic Congress.

which will demand the closest scrutiny of the eyes as well as of the mind. The object is pictured as a whole as well as dissected, and then pictured in parts. It is only by such picturing on paper that clear picturing on the mind is effected.

Land form, to be consciously studied, must be treated in as nearly the same way as the nature of the case will allow. Mere observation or, rather mere seeing, is less effective in this study than in biology because of the size of the object of study. No land surface can be studied on the ground, by an unskilled physiographer, in such a way as to arrive at any definite conclusion as to its essential features and their relation to each other excepting through the medium of drawings. In other words a land area, in order to be studied thoroughly, must be mapped. Class excursions for University students in which careful mapping of the area traversed is not rigidly required have relatively little physiographic value. Even if the excursion is followed by a written report by the student, the result is slight because of lack of any necessary connection between close and accurate observation and a general written description. For public school pupils the excursion is valuable because the teacher is able to illustrate by this means geographic terminology, but the University student has long since passed that stage and must see the *relations* of facts as well as the isolated facts.

Accuracy and minuteness of observation are attained only when the facts are recorded. In physiography, facts are best recorded in a map. It is only after facts have been fully and consciously seen that they can be recorded in a map. Without the mapping, observation will be less sharp. The ability to see land form clearly is attained only through some training in map making. Observing and recording, therefore, have a reciprocal relation.

The study of one land surface, however, such as may lie within the reach of any University town cannot fulfill the requirements of a well balanced and complete course of study in physiography any more than can the study of a crawfish fulfill the requirements of a course of study in biology. A crawfish represents only one of the groups of animal forms. Any one land area of such size that it may be reached and studied as a part of the work of a university course of study will rarely represent more than one group of land forms. The study of one area on the ground, however, will furnish a foundation of fact and experience for the study of other forms by means of maps in the laboratory.

The study of additional and different land forms in the laboratory, cannot run parallel to the study of additional animal forms. The latter may be brought into the laboratory and studied in the same way as the first type.

No change in methods of study is necessary. Land forms cannot be brought into the laboratory. A great number of different forms cannot be studied on the ground because of the practical impossibility of reaching them, neither can they be transported to the laboratory.

The only practicable thing to do is to study an image, and since it must be brought into the laboratory it must necessarily be a reduced image. There is, however, an additional reason for studying a reduced image. Even the study of a land area on the ground without the use of a reduced image for continual reference, fails to attain the best results, because of the impossibility of seeing any considerable area at one time. General views which are as important as detailed examination cannot be obtained on the ground because of the size of the object being studied. The ability to see all the parts of a considerable land area in their true proportions and relations from studies of the individual parts without the aid of maps is attained only by the skilled physiographer. The average freshman does not possess it at all, or to a very limited degree.

The size of the object of physiographic study makes it necessary to study it through the medium of a reduced image either partly or wholly.

The biologist encounters a difficulty of just the opposite character. He must study enlarged images of some of the objects which he studies.

The most perfect image is a model, or in a less degree, a relief map, but it is impossible at the present time to study any large part of the earth's surface by such means simply because they cannot be obtained. Only a few small areas scattered over the earth's surface have been even imperfectly reproduced in this way. For the study of the morphology of the lands of the globe, they are of practically no value. They may, however, be used to illustrate lectures on physiographic principles or the theories of land-form development.

For the study of more than a small number of isolated areas recourse must be had to large-scale topographic maps. Of these there is an abundance as every teacher of physiography knows. Practically the whole of Western Europe and considerable parts of North America are represented by such maps. They are and will continue to be for a long time to come, the chief reliance of the teacher of physiography. From such maps the student and teacher must get their foundation of facts. The getting and classifying of the facts constitute a large part of the work of the undergraduate student in physiography. Before land forms can be interpreted and before geographic processes can be fully understood and realized as actual things a considerable body of fact must be accumulated. Out of these the theory of land-form development must be built up. Even if the student divorces his facts from his theory entirely at first, which is not what is meant here, the later discussion of the theory will be more intelligible because of the ability to test it with the facts. The scientific study of an object consists in the determination, first, of the facts. For the proper interpretation of process and development a greater body of fact is necessary in physiography than in biology. In the latter, process may be studied by observing what is happening from hour to hour or from day to day. In physiography, processes act too slowly for such methods so they must be got at by the comparison and correlation of facts.

We must, however, in University work go beyond mere fact to its interpretation. Land form must be seen as the product of forces acting through time on certain more or less fixed conditions in the earth's crust. That phase of the earth's crust of most importance in land morphology is its structure or anatomy. The relations of anatomy and morphology in the earth are as close as in an organic being. In this is in other phases of earth study we are either limited to a small area or else forced to obtain our facts from maps. From these, in the form of geological maps, there is abundant opportunity to obtain the main facts of earth anatomy over large areas. A large collection of geological maps is as essential a part of the equipment of a physiographic laboratory, as is that of topographic maps.

In the study of such a map for physiographic purposes, no previous knowledge of geology need be required of the student who is beginning his physiographic work. In fact, a certain amount of training in descriptive geometry is of more value than training in laboratory paleontology or mineralogy. The student may not even know the names of the common rocks, though in the great majority of cases he will know at least that much. The student of average ability will learn to read geological maps in a few days. He must have the table of geological formations at his fingers' ends, and know the relative position and age of each.

If the map, either topographic or geologic, be published in sections covering small areas, the sections must be mounted in the form of wall maps as large as can be conveniently handled. The larger the better because of the better general view obtainable from such maps. The broad relations of the various parts can be seen no better when represented on separate sections of a map than when seen by bits on the ground. In many cases the broad relations of land forms are of more importance than minute details.

Next in importance to a large collection of large-scale topographic and geological maps is a large collection of selected photographs. Mere pictures excepting in public school work have very little if any value when used merely as such. When well-selected and properly used they occupy a place that cannot be filled from any other source.

Models, maps and photographs constitute the laboratory equipment for good laboratory work in land morphology, during the undergraduate life of the student.

There are two ways to use this equipment in teaching land morphology, depending upon the point of view taken by the professor. It may be used to illustrate a series of lectures on the theory of land-form development, or it may be used, under the direction of the teacher as a means by which the student may be taught to draw his own conclusions on such development, by the study of the facts of form shown on the maps. In the first case the laboratory is merely an accessory to the lecture-room and the material of the laboratory is merely illustrative material and used incidentally. In the latter case the relations of lecture room and laboratory are reversed. The laboratory is the place where the work is done. It is the place in which facts are collected and manufactured into finished products—where all hypotheses are put to the test of facts.

The latter is the more scientific. It is the method followed in the other natural history sciences—one that has demonstrated its value as a means of educational discipline during the last half century.

A serious difficulty in the study of physiography by the laboratory method at the present time is the lack of a laboratory manual or guide for the student. The biologist has a great number of guides to select from. The lack of this essential in physiography is due partly to the newness of the subject in the University Curriculum and partly to a lack of any tradition as to what should be included in the subject. There is no general agreement among physiographers as to what the term means or what University work in the subject should include; nor as to the method to be pursued in lecture-room or laboratory. Until this condition becomes established the teaching of the subject will be difficult.

Although no manual can be purchased yet, the student in freshman and sophomore work at least, and preferably in junior work, must have one. It must be supplied by the teacher. The best manual is not one that discusses the land forms being studied but one that consists merely of a series of questions or suggestions so drawn that they can be answered only by close and careful, almost microscopic, study of the material. They must be so drawn also that the significant and essential features of the region are brought out clearly. The questions or suggestions must be direct and to the point. General suggestions will not answer the purpose. The student should be required to get his facts from the laboratory material, not from such descriptive literature as may exist for the area concerned. An experience of several years has convinced me that undergraduate students will not as a rule obtain satisfactory results by putting the material before them with general directions for work. The photographs should be studied as closely as the maps. Each photograph should be numbered and the point from which the view was taken as well as the direction and range of view located exactly on the large-scale topographic map. The map and photograph should then be studied together, every significant object in the view located on the map and vice-versa—so that the correlation of the two is complete. This can be accomplished only by a set of questions drawn for each photograph. Probably a better mental conception of the significant facts of form in an area well covered by good geological and topographic maps, and by properly selected photographs, can be obtained by the study of such material, than could be obtained by the student on the ground even with the use of the maps, but without the photographs.

The average student, however, looks upon a photograph merely as a picture, unless his attention is specifically directed to what it shows. Merely looking at photographs is not laboratory study.

Geographic or physiographic literature is concerned to a great extent with the development of land form or with the explanation of the facts presented in particular areas. It cannot in the nature of the case give as clear a conception of the facts as can be obtained by study either on the ground or of a good map. Before explanation of facts can become intelligible, the facts themselves must be observed. Only after a certain body of fact has been worked out for a particular region can the student get the greatest benefit from the literature. He must not even then be allowed to use this outside the laboratory. He must have the maps and other laboratory material at his command while reading. Geographic reading without frequent reference to the maps is of very little value.

There is very little literature that can be placed in the hands of any but advanced students in physiography, because most of our literature on physiography is buried in technical papers on geology. There are, however, a small number of papers that may be profitably placed in the hands of students after the facts of the region discussed have been worked out from the laboratory material. Such papers as Grabau's or Gilbert's papers on "Niagara," Davis' papers on "The Outline of Cape Cod," "The Seine, the Meuse and the Moselle," "The Drainage of Cuestas," Buckman's paper on "The Development of the Severn," Mill's paper on "A Portion of Sussex," some of Fairchild's and Leverett's papers, the descriptive numbers of the

National Geographic Monographs, and a few others. All of the papers named are descriptive mainly, not theoretic.

The part taken by lectures in the undergraduate work in physiography should be made subordinate to laboratory work and recitations or quizzes on the laboratory work. Whatever the relation of lectures to the other work in other sciences may be, in physiography it should be as stated. For undergraduate students there is very little real discipline in listening to lectures however valuable they may be to other students. There is too much temptation to theoretical generalization on an insufficient basis. The average undergraduate is very much inclined to that sort of thing when he reaches the University. This is especially true with regard to Physical Geography. Very careful treatment of such a man is necessary if any work is got out of him.

The time of the teacher should be taken up in directing and assisting rather than in leading.

The study of the facts should be taken up from the areal rather than the subjective point of view, i. e.; the regional idea should be the controlling one. This does not mean that all parts of a region should be studied with equal detail. Special areas which illustrate certain physiographic features particularly well should receive the greatest amount of attention, and the rest of the area studied by the comparative method. The areal study is important in physiography because of the practical as well as the educational value of the subject. If training alone were all that could be obtained by physiographic study then the study of the subject through a few types would be permissible. The facts of physiography, however, are of such great value in other lines of educational and practical effort that this phase of the subject cannot be neglected. In a practical age and a country where the first question asked of any proposition is "What is there in it?" this phase of the subject will appeal to students where no other will.

The work should take up, for example, the physiography of the United States, studying the whole area with as much care as the nature of the case and the data obtainable will allow. Such a course of study will occupy the time of an ordinary six-hour course through one semester or one of three hours through two semesters of the University course.

This may be followed by a three-hour one-semester course on the Physiography of Europe and a course of lectures on the broad phases and world relations of earth form and the theory of physiographic development for another semester.

The student who does not intend to become a specialist in physiography will probably go no further in the subject than this. He may, however, take a semester course in Meteorology or Climatology.

Such work is of especial value to the student who is specializing or is intending to specialize in either History, Economics, Civics or Sociology. The physical environment of man has had, and still has, so profound an influence on the progress and character of his development, that the latter cannot be adequately understood without a knowledge of the former.

If the student intends to specialize in the subject, he must at this point take up geological work if he has not already done so. Otherwise he will proceed with advanced work in which the method is largely dependent upon the individual. No set rules can be laid down for such work in a short paper.

The ideal course in Physiography, therefore, begins with the detailed study of a small area on the ground followed to that degree of detail in which the student will be able to map it accurately and also sketch the essential features from memory.

This to be followed by three semesters of detailed study of physiographic facts in the laboratory and one semester of lectures on physiographic principles. This may be followed by a year of work in Meteorology and material resources for the student who is specializing in humanitarian lines. The specialist in Economics will begin individual advanced work at the end of the second year.

SOME NEGLECTED MATTERS IN GEOGRAPHY TEACHING

As an instance of the kind I may just mention that I met scores of men both ways between England and Australia, who did not know why the southern circumpolar stars were not visible in the British Isles; why the constellations did not always appear in the same position in the heavens at, say, 8 o'clock every evening throughout the year, having always understood that they were composed of "fixed stars." It was equally incomprehensible to all, how a day should be gained in crossing the Anti-Prime Meridian on the voyage from Sydney to San Francisco, and more than one man wished to know if the moon appeared the same in England as in Australia.—*From J. P. Thomson's Round the World.*

EDITORIALS

ANNOUNCEMENT

WE regret to announce a slight change in the editorial management of the Journal of Geography, beginning with the current volume. This change is fortunately, however, more a change in form of statement than in fact, for Professor Lehnerts will continue actively to coöperate in the work of the Journal by his advice and contributions. As an associate editor he will be freed from the responsibility of caring for the constantly increasing details of management and will be free to devote his attention to special problems, in which he is particularly interested and for the solution of which his long and successful experience as an editor and teacher make him peculiarly fitted.

Although there is a change in the editing and in the place of publication of the Journal, there is to be no change in the form and character of the magazine. The Journal will continue to be devoted to the cause of better geography teaching in the elementary, secondary and normal schools, and will, as before, be a magazine for teachers of geography.

It is the desire of the Editor to have the Journal practical and helpful, to include articles on teaching and on phases of geography valuable to teachers. We shall continue the policy of including a certain class of strictly geographical articles of help to the teacher either directly in class-room work or for his general training. We desire to have all the material included good geographically as well as valuable educationally. We have no desire to publish a scientific journal for the geographer, for the field of scientific geography is already well covered in this country.

We believe that there is a demand for a journal that will make scientific geography available for teachers and that will help teachers make their geography teaching better and capable of being judged favorably as good geography teaching as well as good teaching. It is to this field of endeavor that the Journal of Geography will be devoted in the future as in the past.

PRESENT STATUS OF GEOGRAPHY TEACHING

The last twelve years have seen great advances in this country in all phases of geography teaching, but especially in the elementary, secondary and normal schools. The teachers are better trained and more appreciative of the need of more knowledge of geography, the courses of study in elementary schools are more logical and helpful, the work in the secondary schools is more scientific and less mere information concerning a few unrelated facts, normal school departments of geography no longer, as a rule, believe that they can teach the teaching of geography to pupils who have no more knowledge of geography than they gained in the elementary school, laboratory work has come to stay in all phases of geography teaching, the text-books are better, more accurate, more teachable and less encyclopedic, the reference volumes, good geographically and pedagogically, are almost a legion, summer school and university extension courses in geography are well patronized, and in every way the opportunities for better work are more possible than ever before.

There is still a great room for improvement, for the vast host of suggestions from geographers and teachers are still more or less of a chaos. The leaders are not agreed as to what fundamentals they are working for, and hence indecision on the part of teachers as what is best for their classes.

We need to get together and not to continue to scatter our efforts, not with a view to making courses of study so stereotyped that teachers are merely machines working patiently and mechanically at the grinding out of lessons, but that we may know what good geography teaching is and measure our advance in accordance with these ideals and help one another in the reaching of these ideals. It is for this purpose that the Journal of Geography primarily exists and contributions, however brief, are welcomed from all who can help the cause by giving to others that which they have found valuable by experience.

HOME GEOGRAPHY

It is with particular pleasure that we reprint by request in this number, Professor Davis's valuable and suggestive article on home geography, printed in the first number of the Journal of School Geography in 1897 and reprinted elsewhere several times. The article is just as pertinent to the cause now as when first printed, and teachers will find it helpful in showing how to bind together some of the facts of home geography, which are often presented in such an isolated way that the results gained are of little value. Home geography is still unorganized in many schools and contributions to the better arrangement of the subject are much to the point.

THE ARCHAIC IN GEOGRAPHY TEACHING

Courses of study in geography and school text-books still contain a vast number of facts of little or no value except to the expert advanced student. This largely results from the fact that the earlier geographies were mostly compends of great encyclopedias, which included all that was known about all phases of geography.

By a process of gradual elimination many of the facts too difficult for school purposes or of no value for beginners have been omitted, but conservatism has kept many facts in our texts just because parents and adults cannot approve a course that does not include all that they had in their school work a generation ago.

An experience of a number of years has shown the writer that teachers in summer schools and extension courses always want two matters explained "because we have to teach them." These are the condition of the interior of the earth and the causes for continent and mountain building—both of which are not necessary in school work and too difficult or little understood to be given even to somewhat advanced pupils. There is no pedagogical or geographical reason why such topics should be included in our school work and every reason why they should not be. When the experts in a field grant that their knowledge is incomplete and must remain so, teachers should not teach a part of what is known as the whole truth and give the impression that the problem is solved.

To teach that continents and mountains do grow, that the interior of the earth is hot and how we know it, is proper and necessary, but to teach this or that theory in reference to vulcanism or mountain building as the whole truth, is wrong because some day some of the pupils will find the so-called truth error and will lose faith in their teacher and the subject.

Teachers should be proud to acknowledge their ignorance on certain topics in geography, concerning which the best experts are only partially informed. The ignorance of proved facts and principles of long standing is to be deplored, but a teacher need fear no stigma of ignorance when she acknowledges that she does not know the answer to problems of the type mentioned, for such "ignorance" is really knowledge.

THE VALUE OF GEOGRAPHY

"Even to know where the places one reads of are, what is their climate, and how they are peopled is something; but, taking the wider view of geography as the science which aims at explaining the adjustment of people to land, there is scarcely a problem of past history or of present politics and economics in any country which cannot be elucidated by the application of its principles."—*H. R. Mill, International Geography.*

REVIEWS

GEOGRAPHICAL INTERPRETATIONS OF AMERICAN HISTORY[1]

THE contemporaneous appearance of two works devoted to the discussion of the physiographic basis of American development is significant both of an enlarging view of the science of geography in this country and of the changing attitude of historical students toward their own subject. Significant, too, is the fact that both books are by students primarily interested in geography rather than in history. Miss Semple is a student of Ratzel, whose recent death is lamented by American scholars. He was a forerunner in the path that American historians must follow who view their problems as those arising from the study of the evolution of society in the American environment. Professor Brigham occupies the chair of geology in Colgate University, and approaches his work with a better training in geology than in history.

Miss Semple views her subject principally with reference to its bearings upon the westward movement, although with attention to other topics. In outline, the book is arranged as follows: A discussion of the Atlantic States of Europe leads the way to a consideration of the discovery and early exploration of America. In successive chapters, she points out the influence of rivers upon exploration and settlement; the influence of the Appalachian barrier upon colonial history; the westward movement in relation to the physiographic features of this mountain system; the geographical environment of the early trans-Allegheny settlements; and the Louisiana purchase. Pausing at this point, to trace the geography of the Atlantic coast in relation to the development of American sea power, she discusses the geography of the naval and military operations in the War of 1812. The spread of population in the Mississippi Valley is next considered with reference to geographic conditions; and this is followed by a treatment of the physiographic forces which controlled the expansion into the Far West by southern and by northern trails. Having thus given a geographical interpretation to the movement of exploration and settlement, the author emphasizes the geographic forces which determined the growth of the United States to a continental power. The chapter on the inland waterways affords opportunity for her to point out the controlling influence of physiography upon the inland commerce and internal improvements in the United States. Again recurring to the effect of geography upon War, Miss Semple gives an interpretation of the strategy of the Civil War from this viewpoint. Three-fourths of the book are given to the preceding topics. In the remaining pages are successive essays upon the geographical distribution of immigration; of cities and industries; and of railroads. Under the heading of the United States in relation to the American Mediterranean, she deals with our connection with the West Indies, and she closes with a brief characterization of the United States as a Pacific Ocean power.

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[1] American History and its Geographic Conditions. By Ellen Churchill Semple. Boston and New York. Houghton, Mifflin and Co. 1903.
Geographic Influences in American History. By Albert Perry Brigham. Boston. Ginn and Co. 1903.

Miss Semple's work so abounds in geographical interpretations, both of the large and the particular relations between history and geography, that a detailed review is impossible. The work exhibits both a grasp of the larger lines of American growth in reference to geographical conditions, and considerable familiarity with details. Evidently deeply influenced by Ratzel, she draws upon his physiographic doctrines, illustrating and reinforcing them by American data, and finding in European and Asiatic movements striking elements for comparisons. She has made it perfectly clear that conventional American historians have neglected a rich and essential field for interpreting the course of American development. At the same time she has furnished the general reader with a fascinating, and, to most of them a new, view of our history.

The work brings out the part played by mountain barriers, passes, and valleys, rivers, lakes and prairies, soils, temperature, rain-fall and similar conditions upon American history. The maps of the census showing distribution of population from decade to decade are interpreted in terms of geography; and the frontiers—physical, ethnographic and political—are considered with reference to physical factors.

Only occasionally does the author give indications that her training is less thorough in history than in geography. In illustration are such slips as crediting the treaty with Spain in 1795 to Jay instead of to Pinckney. The unprejudiced historian would hardly subscribe to the positive statement that California's "southern portion fell within slave territory according to the Missouri Compromise." It is a mistake to leave the impression that Iowa's early population was of northern origin, and Miss Semple gives too early a date in saying that "the movement of population, at least after 1820, was in general from free State to free and from slave State to slave."

Some of the topics afford opportunity for a more effective justification of the main thesis of geographical influence, than Miss Semple gives us. In discussing the Louisiana Purchase, for example, Miss Semple appears to be unaware of the programme of France to include within that province the area between the Alleghenies and the Mississippi. No fuller recognition of the proposition that a river constitutes a poor barrier could be found than in the efforts of France and Spain to push American political authority back to these mountains. The memoirs and military plans submitted to France on this subject from 1787 to 1800 afford abundant recognition of this fact. In the history of the Spanish posts on the Mississippi the author might also have found additional evidence for the proof of the importance of the controlling heights on the east bank of the river, an importance which she brings out in her chapter on the Civil War. The same posts which North and South contended for on this river were the ones that Spain and the United States quarrelled over at the beginning of the Republic.

The physiographic forces are well brought out in general, but a more adequate treatment of the relation of forests to settlement would be acceptable and the influence of the prairie areas is not clearly presented. The Far West, aside from the Pacific Coast, is hardly used as a means of enforcing geographic influences, after the period of the fur trader and the early trail-makers, although the region is rich in material for physiographic interpretation.

In general, Miss Semple, possibly from her Kentucky residence, has laid greater stress upon the geographic influences as shown in exploration, early settlement and war, than in those more enduring factors of natural resources, and conditions that are determining the social development of the American people of the present and of the future.

Professor Brigham treats his subject from the point of view of physiographic provinces, and like a true New Yorker, starts with the Eastern Gateway of the United States, by which he means the Hudson-Mohawk line to the Great Lakes. In successive chapters New England, the Appalachians, the Great Lakes, the prairies and the South are described, and then comes an interlude in the shape of a geographical interpretation of the Civil War. It may be remarked, in passing, that a comparison of the treatment of this subject by the two authors shows interestingly how, with agreement in essentials, two geographers can handle the same theme quite differently, each with merits of his own. The arid region, the Rocky Mountain belt, and the Pacific Coast are next dealt with, and the author closes with a discussion of American destiny from the view-point of geography, and an addendum in a description of the study of American geographical conditions by various departments of the Federal government.

From this brief indication of the scope of his book, it is clear that Professor Brigham's treatment admirably supplements and checks the work of Miss Semple. The author writes primarily as a geologist dealing with the elementary facts of the geological history of each of the great provinces, and proceeding to illustrate by facts of history and existing social and economic conditions, the geographical influence of each province upon its people. He does not limit himself to descriptive and historical illustrations, but adds predictions of the lines of future growth under the influence of physical conditions. The book is well written, and is certain to be useful in laying the geographical foundation for history in the schools where it may be used. But, on the whole, the geography, geology and exposition of contemporaneous economic conditions, leave the historical data rather in the background.

In both of these books we have admirable features. They do not make the mistake of trying to state a law of historical development in terms of physical conditions; they are not attempts to rival Buckle. This is altogether praiseworthy; but at the same time, it must be added that they leave room for a more fundamental discussion of the importance of physical conditions in American development. They are in the nature of introductory and popular treatises upon a subject that must at some time be handled more deeply. The United States is a collection of physiographic provinces comparable in areas, and in resources, to countries, and even to empires, of Europe. Across these potential nations, if the term may be used, the stream of American settlement flowed. Each great province received these tides of population, adjusted them in successive eras to successive revelations of the resources and physiographic influences of the province. Each bred its own society, produced its leaders, and interacted upon its neighbors. When the American historian shall unfold the combined influences of geography acting upon western expansion and shaping society to the resources of these vast provinces, and of the ethnographic and social groupings, in explaining American development we shall come nearer to an understanding of the meaning of the nation's history. In the meantime we may be thankful for two such contributions as these of Miss Semple and Professor Brigham.

FREDERICK J. TURNER.

RECENT PUBLICATIONS

STUDENTS LABORATORY MANUAL OF PHYSICAL GEOGRAPHY. By Albert Perry Brigham, pp. xi + 153. New York, D. Appleton and Co., 1905.

A laboratory manual to accompany the text-book written by the author in association with Mr. G. K. Gilbert. Gives detailed questions for laboratory work, suggestive in many ways. To be reviewed later.

THE WESTERN UNITED STATES. By Harold W. Fairbanks, pp. vi + 302. Boston, D. C. Heath and Co., 1904.

A well written, well arranged, and well illustrated volume for supplementary work in reference to the Western United States. Authoritative. Unfortunately contains no index, and hence loses much of its value as a reference book for topical work.

THE FROZEN NORTH, AN ACCOUNT OF ARCTIC EXPLORATION FOR USE IN SCHOOLS. By Edith Horton, pp. iv + 157. Boston, D. C. Heath and Co., 1904.

An interesting and well chosen summary of the work in the Arctic regions from 1818 to 1902. Illustrations are in many cases crude and not up to the standard of the text.

ROUND THE WORLD. By J. P. Thompson, ppt xxvii + 358. Brisbane, Australia, 1904.

An account of a world encircling trip by a most eminent geographer. Much interesting personal narrative and some kindly criticism. An appendix contains an inclusive summary of the geology and geography of Australia.

HISTORIC HIGHWAYS, Vols. 12, 13, 14. By Archer B. Hulbert. The Arthur H. Clark Company, Cleveland, Ohio, 1904.

Vol. 12 is the second of the volumes devoted to Pioneer Roads. Especial attention given to the Old Northwestern Turnpike and Braddock's Road.

Vols. 13 and 14 discuss the great American canals, the latter volume being devoted entirely to the Erie Canal.

These volumes are more pertinent to the needs of the historian than to the geographer, though they do make available many interesting and valuable facts not easily secured elsewhere.

NOTES

THE USE OF THE CONSULAR REPORTS.—Very few of our teachers know of, and use, the Consular reports. They are excellent help in the study or teaching of geography and may be had for the asking.

Consuls date back to the middle ages, when they were appointed by commercial cities like Venice and Genoa. Their rights were as follows:

1. All merchandise exported by them was free from taxes and duties.
2. They were given quarters in certain maritime cities.
3. They were granted the privilege to have decided according to their own laws and by judges from their own nation all the controversies arising between persons carrying on trade under their protection.

The duties of the Consuls to-day depend upon treaty, usage and statute. In general they relate to the care of their countrymen's property, especially in case of death or shipwreck; certification of births, marriages or deaths; arbitration (voluntary) of disputes, as between master and crew; the relief of destitute seamen; the control of their country's shipping; an examination of their country's trade, with suggestions for its increase; in fine, a general care over the rights and interests of their countrymen, so far as they lie within their districts, to secure their just treatment by the foreign government.

The Consular system is under the Department of Commerce and Labor. The Consuls are appointed by the President and confirmed by the Senate. We have nearly a thousand Consuls in other countries and have between five and six hundred foreign Consuls in this country.

Daily Consular reports (excepting Sundays and holidays) are printed by the government. They touch upon a great variety of topics. One Consul reports an appropriation of about two and a half million dollars for a drainage system in South Africa and suggests that an effort be made to sell United States goods, because they are superior to the English goods.

Another Consul reports the commercial conditions of the country in which he is located. He says the Viceroy of Two Kwango issued a proclamation inviting merchants to come together to discuss the following topics:

1. Chamber of commerce.
2. Inspectors of commerce.
3. Exhibitions of articles.
4. Reports on market conditions.

5. Commercial training schools.
6. Consulting with foreign merchants.

Often the Consuls are asked to investigate some special topic and reports are made upon that. In 1903 three of the December reports were devoted to macaroni wheat and flour. Our government had become very much interested in foreign markets for this wheat when it was found that some of our Western land was particularly well adapted to that kind of wheat.

The report for December 15, 1903, had brief reports on the following topics:

1. American Trade and Capital in Newfoundland.
2. British Naval Station at Esquimault.
3. Heating and Cooking Stoves in Mexico.
4. Efforts to Promote Trade in China.
5. Trade of Moscow in 1903.
6. New Sugar Bonus in Hungary.
7. Immigration to Manitoba from the United States.
8. Beet Sugar Factory in Turkestan.
9. Coal and Pig-Iron Output in Germany.
10. Wheat Crop in France.

Any teacher can secure these daily reports by writing to the Department of Commerce and Labor, Washington, D. C.—*Mara L. Ferguson, North Springfield, Pa.*

A SUMMER SHOWER IN ARIZONA.—Just why it should rain so much more in July and August than during the remainder of the year seems as yet to be explained. Whether the trade winds wander thus far northward, whether the westerlies ascend the Colorado Valley from the Gulf of California, or whether the same moisture that evaporates here falls back again, is not yet determined.

It was a sultry day for Arizona, near the end of August, with the mercury up above the 100° mark. The mountains around about Tucson were crowned with masses of clouds, especially heavy and threatening over the hills fifteen miles east of the place where a thunder shower was in progress. The wind was blowing from the West and it seemed a perfectly safe undertaking to walk the distance of a mile that separates the University from the town. It was evident that the storm was of unusual violence, for through the clear atmosphere the roll of the thunder could be distinctly heard. The town had been nearly reached when I noticed the wind-mills on the east side of the street were facing the East, while on the other side they were turned toward the West.

A lumber yard was within a block of me and I hastened toward the office. The wind was growing in violence every second, and ere the shelter was reached, big drops of rain were falling. The office faced the South. By the time I reached the shelter both hail and rain were beating against the door despite the protecting porch. The flood was coming down faster than the ice could melt or the water run away. The wind blew with such fury that it was more than one man could do to hold the door shut. Within ten minutes the wind had shifted toward the West, so that the door could be opened without admitting the deluge, and, within ten minutes more, the rain had ceased. The wind had completely boxed the compass and was again blowing a gentle breeze from the West. About an inch of rain seemed to have fallen near the store.

I left the store before the last drops had fallen, and it was well that I did so. From the gently sloping country east of the town, came muddy streams half the width of the street and from four to six inches in depth. Muddy, rushing rivulets that blocked the streets for half an hour. Within another hour nearly all evidence of a recent shower had vanished.

The only damage this storm did was to break an irrigation dam and to flood the streets.

A flood from a similar storm caught a Customs officer and his guide a few days later, while they were crossing a narrow valley in the mountains near by. They noted the approaching flood and drove with all speed toward an island-like hillock capped with a clump of trees. They barely had time to tie the horses and to fasten the wagon to these trees before the flood had climbed the hillock. The water rose until it partially filled the wagon-box. All night long the stream rushed by them, but by daybreak the flood had passed and the travelers were enabled to proceed on their way. —*Glenn A. Wilcox, University of Arizona, Tucson, Ariz.*

An Exercise on Weather Maps.—The weather of Arizona is practically the same from day to day through the greater part of the year. Bright sunny days, with cool mornings, that range from about 45°-50° F. at sunrise to 80°-85° F. at noon-time. The cyclonic storms pass regularly but the centers are usually far to the North and the only changes here are slight variations in the directions of the winds together with a few clouds of the lighter orders when a low pressure area prevails.

The ordinary weather maps are not common here, but the Government has sent bundles of old maps from time to time.

The object of the exercise was to impress more firmly upon the class the changeableness of the weather throughout the United States, as well as to review the facts gleaned from the text-book. The maps on hand were those of December, January and May. These were arranged in booklets of three maps each, representing consecutive days. It would be easier to correct the papers if enough maps representing the weather for the same three days to supply the class could be obtained.

The outline we followed ran thus:

a. In your note-books write the dates on your sheets.

I. *b.* 1. Locate by States the *"Lows"* on the first map.

2. Note the pressure and temperatures near the centers of low pressure.

3. Note the direction of the wind all around the word *"Low"* at a distance of one hundred miles from the center. Does the wind blow in a similar manner around all the low areas? Can the general direction be classed as clockwise or counter-clockwise?

4. Is it raining, or snowing, in the neighborhood of the *"Lows"?* If so, in which direction from them?

5. In general, is the weather around the *"Lows"* clear or cloudy? Is it the same in all directions from the *"Low?"*

c. Make observations similar to those under *b* for areas of *"High"* pressure.

d. Find the difference between the *"High"* and *"Low"* pressure in inches of mercury. Also find how the temperatures compare.

e. Compare the size of the *"High"* and *"Low"* areas.

f. Which way from a *"Low"* can you generally find a *"High?"*

II. *g.* (*a*) If a storm path is marked on your map note its changes of position from day to day.

1. Which way does it travel?
2. How many miles each day?

(*b*) If no storm path is marked, trace the changes in position of the *"Highs"* and *"Lows"* from the first map across the other two. Do they follow any general direction? How far do they travel in 24 hours? (A rule can be made from a slip of paper marked as is the printed scale.)

h. Over how many States does the largest rain or snow storm extend on the first map? Does it increase or diminish during the next two days?

i. Fill out blanks similar to the following for (*a*) Phoenix, Arizona; (*b*) Portland, Oregon; (*c*) Boston, Mass.; (*d*) Duluth, Minn.; (*e*) New Orleans, La.; (*f*) Columbus, O.:

Day	The direction of the wind	Barometric pressure	Temperature	Weather, fair, cloudy, rainy, &c.
1st				
2nd				
3rd				

j. From the data found under [*g.* (*b*)] and under [*i.*] predict what the weather shall be at each of the places mentioned under [*i.*].

NOTE:—If practicable, the fourth map might be supplied and the pupils allowed to compare their predictions with the weather that did take place.—*Glenn A. Wilcox, University of Arizona, Tucson, Ariz.*

OUT OF DOOR WORK IN GEOGRAPHY.—Books came into such honor at the Renaissance that they excluded observation from education for centuries. The sciences now have learned to use books as invaluable records, but education still gives them too early an emphasis.

School books teach that the earth is an oblate spheroid, a view founded on studies made in 1870 of only three points of the earth's surface. We know as a matter of fact now that it is simply and accurately a ball, without strictly geometrical form. We should teach that it does not seem to be a ball because we see so little of it at once and illustrate concretely. Illustrations like the hulling down of a ship at the horizon are admirable to try, but worthless to merely tell about.

Elementary work in science, and geography is science, consists in getting children to notice things that we want them to reason about later. More showing and illustrating is in order in early years and less book. Ideally the book account is taken with real illustration. Explanations belong mostly to the high school age. That is why we put geometry there.

The laboratory method aims to arouse mental activity with regard to things and much of this activity should be turned on the world about us. Imagine music taught without any sounds! But that is how physics and chemistry used to be taught and so geography is taught to-day. Don't define a river. Your definition is of little value except for the purpose of debate.

Go out and see a river; go out and see deltas and flood plains. The outdoor world is full of life and change in its geographic as well as in its biologic aspects, and the geographic aspects are more available for teaching children. That they are not believed in at present is because teachers do not go out of doors to see them. Maps should be symbolic of the real world, so we must point out the reality and teach the manner of symbolizing it.

The exposition shows the opportunities for better use of this symbolism than is made. If the sixty minutes a week that the Committee of Fifteen suggest for oral work in lower grade geography be given to out-door work under teachers who can make a map and read a map, geography will make much progress.—*School Journal,* July, 1904.

USE MADE OF LOCAL LAND FEATURES.—From our room windows a large hill fifty feet away is easily studied. "Mt. A." is its local name—all the children know it. Before dismissal at noon it takes but a few moments to know that it is so easily noticed because so much higher than the rest of the land around. A desire to know of what it is made is easily aroused.

In the afternoon many children bring in papers or boxes of soil obtained therefrom. These, all examine to note some little loam and grass-roots found at the surface, with the mass of material, gravel, sand and stones. So the hill is just a "lot" or mass of earth and stone higher than the rest of the land around.

Then we go to the windows to hold pencils against the hill from the top to the left bottom; they slant. From top to right bottom. They slant more. Here are two slopes. One is easy to walk up, a long coast in winter, with better yards for the houses upon the hill; it is gentle or gradual. The other slope is hard to climb, water runs down fast, stones roll frequently; it is steep or abrupt. The pencils are tried in all possible places. There is no place where there is no slope. We infer that the other side must be very like. Children living there, very familiar with it, confirm our inference, and before the next day most have verified it. The hill slopes everywhere from summit to base, but not uniformly.

Again we go to the windows. This time to hold string to outline the hill as an aid in modeling in sand and drawing on board and paper. Next the base-line is traced and the summit located upon the base—in sand and drawing. A few bright dark lines are drawn to show abrupt slopes; a few long light ones for the gradual slopes. Then follows a drill in reading plans and side drawings—by voice, sand or pencil. This is followed by brief work or reference to other local hills, summer vacation knowledge, pictures and so on.

The transition to mountains is accomplished by a trip upstairs. Looking from the windows there a low range of old mountains is clearly seen, and drawn. Many children have been there and know the range is made of rock. It appears just as an upfolding of the general surface. One big round has its own name—which calls attention to the separate rounds or peaks or mountains.

The children appreciate the beauty the range creates in the landscape, and know how cool it is upon the tops—so the formal work easily follows.—*G. A. W.*

GEOGRAPHY TEACHING IN INDIA.—Let us examine the system of teaching of geography in the generality of our schools. Here and there, there are honorable exceptions and we leave such schools out of consideration for the present. The Indian school-masters are generally slaves of text-books, and on these text-books a lesson is set on the previous day. The pupil while at home spends a hard hour in getting by heart the long lists of names of a country's boundaries, its physical features, productions, exports and imports, and lastly, towns and forms of government. It affords innocent amusement and at the same time rouses the pity of a passer-by in the road to hear one of our school-boys read his geography lesson aloud at nights. He conquers his aversion and sits to study with dogged will, devoting an hour of patient work to the subject. A few days ago I had an opportunity of hearing a boy read the exports and imports of England. He began by reciting the words, "The principal exports are" seven or eight times, and then "cotton and woollen" another seven or eight times, then "goods and metals" seven or eight times again, and at last, came the full sentence to be recited "The principal exports are cotton and woollen goods, metals." Then each of the words "machinery, cutlery, coal, linen manufactures, etc.," were recited six, seven, ten and at times fifteen times also. Such is the sort of home preparation our pupils make. With these long lists of names stuffed in their brains they come to the class.

At the appointed time, the geography lesson begins; the monitor brings the map before the teacher enters and hangs it on the black-board, for there is no other provision made for hanging the map. Then enters the teacher and asks his boys the lesson set for the day. On the boys supplying him with the information, he gently takes the text-book out from the class desk, if the monitor has not previously done it, and spreads it before him on the table. Now follow a series of questions from the teacher, and invariably the answers to these questions are long lists of names. The recitation of these long lists over, the map pointing begins. This over, a new lesson is set for the next day. Occasionally a question or two is asked in physical geography. Even here no attempt is made to correlate the facts. The teacher dictates notes from his note-book and the boys take it down. The lesson for the day is over. No explanations are offered to make the subject attractive and intelligible. The teacher is a machine acting mechanically within the boundaries of his class-book. His one aim is to stuff the young minds with painfully heavy particulars. Why then wonder if the poor student pressed under this heavy weight drops down even before the appointed time? What ought to be the most engrossing and fascinating of all the subjects of school curriculum is generally the subject hated both by the teachers and the taught.

The object of the geography teacher should not be to make his pupil a walking encyclopedia by making him commit to memory all sorts of names. What the geography teacher ought to strive at is the elimination of unnecessary, and the emphasizing of important features. His pupil need only know the names of the most important towns of the world. But he should possess a thorough knowledge of their position and the advantages they have on account of their position. The requirements of the towns and their products, their historical associations and present importance might be emphasized. The boys must be made to express in words what they observe on the map with regard to the places. The black-board should be used to illustrate the lesson, for the map may not show the exact character, say of a harbor like that of Bombay or Port Jackson. The lesson might be enlivened and the imagination of the pupils awakened by giving them an idea of the influence of geographical position on the history and civilization of the people of the country or the town. Photographs, pictures and accounts of travel in those countries, or descriptions of towns as given by globe-trotters will doubtless give vivid and correct ideas of the country that is being studied, and will increase the boys' interest in the lesson. Above all the memory must be exercised very sparingly. I would rather our boys should know all about a few towns thoroughly than that they should give us big catalogues of names of obscure and unimportant towns with which our geography books are full. There is no fear that our boys will miss the mark in the University examinations; for what is lost in quantity is gained in quality. To attain all these results, the teaching should be in the form of a real conversation. Most of our pupils fail in the Examination not so much because they do not know facts, but because they are not able to express in words what they do know. I should like our geography classes to be also English composition classes. For this purpose, conversational teaching is the best. The teacher by careful questioning can lead the class to reason for themselves according to a plan previously determined upon. The pupils may be allowed to breathe the stimulating atmosphere of liberty and allowed time to express his thoughts. It is only then that the teacher can see what it is that attracts the class and what devices are most telling on the pupils. He has to look at the subject from many stand-points, and every difficulty that the pupils raise in the course of the lesson must be an additional enlightenment to him. Irrelevant questions may be raised by the class; a skillful teacher ought to be able to discover a link between the questions and the lesson. The teacher himself may have to digress a little at times, and such digressions may be very valuable, as happy suggestive ideas very often strike him when he is actually giving the lesson, ideas which did not occur in the course of his study or when preparing the notes of lessons. In the course of the conversation with his boys there is ample scope for making the teaching as realistic as possible. The one thing during the course of the conversation that the teacher has to bear in mind is to make the boys express their answers in simple and clear English. Note-giving also may be occasionally indulged in. On some occasions, the boys may be asked in the geography class to reproduce on paper what has been taught to them. In the matriculation class problems also may be set to see how far the pupils have been able to grasp the principles of the science. All this would mean considerable work to the teacher. It is only when he ungrudgingly gives his time to the work of the class, that he will not degenerate intellectually as years go by—he will not be dull, dogmatic and stereotyped. Though after a time he may lose the enthusiastic freshness of youth, yet by constant study and application to the subject, he will gain the freshness which arises from deeper knowledge, greater skill and wider sympathies.—*Indian Journal of Education,* May, 1904.

CURRENT ARTICLES ON COMMERCE AND INDUSTRY.—
October:—

Coffee: Its Introduction and Cultivation in Costa Rica, *Bull. Intern. Bureau of Am. Republics.*

Consul, The American, *Sat. Evening Post,* October 22.

Cotton, Artificial in France, *Mo. Summary of Comm. and Finance,* August.

Cotton: The Fight to Save King Cotton, *World To-Day.*

England, Physical Deterioration in, *Cons. Rep.,* September.

Foreign Trade with Asia, *World To-Day.*

Iron and Steel Manufacture, Modern, *The Mfr.,* October 1.

Italian, The, in the United States, *World's Work.*

Japan, Commercial and Industrial Situation in, *Mo. Summary of Comm. and Finance,* August.

Lobsters, A Kindergarten for, *Sat. Evening Post,* October 15.

Luxury, The Lap of, What Mr. Midas Does with His Day Off, and How Much It Costs Him, *Sat. Evening Post,* October 1.

New York: The Empire State, *Harper's Weekly,* October 1.

Potash Minerals of Germany, *Cons. Rep.*

Railroading, Early Days in, *Sat. Evening Post,* October 15.

Rubber Growing in Nicaragua, *Cons. Rep.,* September.

South Africa After the War, *Sat. Evening Post,* October 1.

Trusts: Economy Reduced to System, *System.*

November:—

Accidents, Railroad, in the U. S., *Rev. of Revs.*

Agriculture, The Awakening of, *Country Life in America.*

Canals: The Trackers of France, *Century.*

Coal Production and Consumption of the World, *Mo. Summary of Comm. and Finance,* September.

Communism, An Experiment in; the Doukhobor Commentary on Tolstoyism, *World To-Day.*

Consul, The American; a New Type, *Booklover's Mag.*

Corn, Iowa's Campaign for Better, *Rev. of Revs.*

Cotton, The Rich Kingdom of, *World's Work.*

Dry Goods Business: How to Get a Start, *Success.*

Egypt, To Fertilize Two Million Acres in, *Mo. Summary of Comm. and Finance,* September.

Galveston, The New, *World To-Day.*

Glass Business, The Early History of, *Paint, Oil and Drug Rev.,* November 9.

Household Industries (Symposium), *The House Beautiful.*

Immigration Exploitation: How Railroads Encourage Homeseekers, *Judicious Advertising.*

Indigo, Synthetic Versus Natural, *Paint, Oil and Drug Rev.,* November 2.

Japan, Some Facts About, *Nat'l Geog. Mag.*

Jute Industry, *Mo. Summary of Comm. and Finance,* September.

Leather Making, Modern Processes of, *The Shoe Retailer,* November 9.

Marble Quarrying, *World To-Day.*

Marble: The Carrara of America, *Sci. Am.,* November 5.

Merchant Marine: Getting Business for the Atlantic Liners, *Book-Keeper.*

Olives and Olive Oil, *Paint, Oil and Drug Rev.,* November 23.

Petroleum Prospecting, Does It Pay? *Paint, Oil and Drug Rev.,* November 9.

E. D. J.

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OUT OF DOOR WORK IN GEOGRAPHY*

BY MARK S. W. JEFFERSON

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EARTH IN REALITY A BALL; IN BOOKS AN OBLATE SPHEROID

WHAT is the shape of the earth? You will tell me that it is an oblate spheroid in a mixture of Latin and Greek that betrays the mediaeval source of the statement, yet it is known to be nothing of the sort. The ancient Greeks wrote the earth down a sphere. Observing by the stars that its surface was curved, they assumed with charming simplicity that it must be spherical, since the sphere is the only perfect solid with curved surface. All of their measurements were made in the tiny patch of the earth's surface between Asia Minor and Greece in one direction, and between the Balkans and the first cataract of the Nile in the other. When the telescope was invented better measures on the stars showed men that the earth was not a sphere. Isolated measurements now made in small portions of Ecuador, France and Lapland were supposed to authorize the statement that the earth was the oblate spheroid of the books, with elliptical meridians and parallels circular, still a large conclusion based on a small foundation of fact. As larger portions of the earth's surface were included in the area studied, it appeared that the parallels were not circles but only more nearly circular than the meridians were. Further study only reveals further irregularities until Geodesy is tempted to rest on the description of our planet as a geoid, which means in plain English earth shaped. There is no purpose other than having a learned air which is not satisfied by calling it a ball. A six-inch globe, modelled exactly in the proportionate shape of the earth would be only a fiftieth of an inch shorter from pole to pole than from side to side on the equator. The eye could not detect any defect from sphericity, for the other deviations from a spherical form are of still less magnitude. A body that appears to the eye to be a sphere but is not probably of perfect sphericity is what men mean by a ball. I cannot see any possible educational interest in the earth's polar flattening until the high school course in physics is reached, or higher courses in astronomy and geodesy. The very roundness of the earth is with most men a matter of faith, only it is not frankly treated as such. Those scientific men, the geodesists and astronomers, who tell us what we know of its shape, have learned it by measuring the difference of direction of the stars from different parts of the earth's surface, essentially as the Greeks learned its roundness twenty-three centuries ago. The so-called argument from the appearance of a ship as it sailed away from land was not invented for more than three centuries and is another illustration of the habitual substitution of words for things or thoughts. Have you ever watched ships in the distance? You will find it much less clear in fact than in the book. In the first place a very clear day is needed to give good seeing down to the horizon. Even then the horizon is so far that unless you are provided with a glass it is difficult to make out more than that very little of the ship is visible anyway. I am convinced that not one per cent. of those who teach this "reason for believing the earth to be round" have ever even tried to see it for themselves. I am confirmed in this belief by the fact that the argument is given in the same form in the region of the Great Lakes where masts are now a rarity, and a single day's experience will satisfy anyone that the last part of a vessel visible is the smoke. To-day we shall simply teach children that the earth is a ball. When they suggest that it does not seem so, we shall state that it is because we see so little of it at once, and we will invite them to examine the portion of a globe visible through a hole in a card small enough to let them see no more of its surface than we can see of the earth when we look upon it even from an elevated position. We shall no longer offer explanations that we have not ourselves tried, but as children take more easily to illustrations than to explanations, for a considerable part of their schooling they will use the globe for their only map.

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*Read before the National Educational Association, July, 1904

WHEN WE GET CHILDREN TO NOTICE WE TEACH ELEMENTARY SCIENCE

It is felt that the elements of all the sciences are to be taught in the early part of geography, but I think there is little clearness in the public mind as to what constitutes the elements of a science. My notion is that we should not have little books about things, but a little contact with things in the way of illustration. Our elements of astronomy are too often words stating the results of the astronomer's work and the explanation of things the pupil has never noticed. It is supposed that observations may not be attempted because they are so difficult or the instruments are so expensive. I think it would be more rational to leave out the book with figures for size and distance of the planets and look at the real stars and planets some, just with our unaided eyes as the Greeks had to do. Instead of treating children to a diagram and explanation of the cause of the seasons, I would direct their attention more to the actual facts of the seasons; have them note the varying height of the sun in the sky, the varying length of the day. It is logical to have the high sun and the long day firmly associated with the heat of summer before we attempt to point out the causal nature of the association. Such a procedure always enters into the suggestions of the trained astronomer or geographer, but the practice is still too little known. In chemistry and physics we are now faring better and in botany and zoology, the books, it is understood, are not open to the beginner until they are illustrated by the things. Observation is not to be done at second hand and the school books in those sciences of the last generation are relegated to the waste heap for having attempted to enlighten us by relating what would have happened had we made an experiment. Nature study in the school is an evidence that we are trying to do well by children in this direction as far as we understand it. Agassiz is supposed to have transformed the more mature teaching of natural science in this country in the same matter of directing attention first to the facts before attempting to examine relations. Concrete geometry in the grades is in the same line and is widely urged.

THE THEORY OF LABORATORY WORK

It is the question of the laboratory method. In general the progress of human knowledge has been by observation and record and discussion of observations, these being either tentative to see what will happen, or in the nature of verifications of what the mind expects. Progress is enormously facilitated by the records of past work accumulated in books, enabling each investigator to stand as it were on the shoulders of his predecessors, but further progress is possible only by further observation, and past progress is intelligible only in the light of the observations on which it was founded. This is the part laboratory methods should play in education. The concepts that the race have acquired by observation must be acquired by the individual in the same way. It is true alert-minded individuals come along now and then who have done some observing for themselves. They bring to class the basal concepts that we must build up in others by laboratory methods. Such people are ready to use books, to set *them* observing is to infringe on their personal liberty. When the basal concepts sought have been established the laboratory work has accomplished its end. Mere telling can never establish these concepts. No process of development can elicit them unless a concept nearly like them already exists in the mind. Education suffered generally from this defect through the sixteenth, seventeenth and eighteenth centuries. Words were habitually put in place of ideas. The rise to ascendency of science in the nineteenth century was effected by men who rebelled at this domination of the printed word, just as they rebelled at the domination of unfit rulers by divine right. My plea, the plea of all who are interested in geography to-day is that geography, like physics and chemistry, may break away from the dominion of the mere word and start with the basal concepts given by observation. You all know Horace Mann's story of the children who answered with admirable precision and promptness all the questions put to them about the natural divisions of the earth, oceans, continents, gulfs and islands, but when asked by a visitor if they had seen this earth they were reciting about replied in good faith and unanimously that they never had. The earth itself is all about us, Cape Horn or the Rocky Mountains are not more essential parts of it than the region about our house. Let us not have a little book of home geography to start our pupils with, but let us take them out to make acquaintance with the near parts of the world for themselves. Imagine a course in music with no sounds in it! Imagine the children to have all the melodies described to them as things that would be beautiful if they heard them sung but never to hear them! To be taught to read the music and appreciate it by imagining the sound of each note as it came before the eye! Do you think they would care much for music or stay long in school to study it? Yet what is this but the method that is employed in geography? Distant lands are described in terms that are only made known to the class in description. Pages of lessons are assigned and hours of classes pass that are unillumined by any gleam of apprehension. Teachers themselves too often have no associations out of the book with the matter of the lesson. Recall to mind the knowledge the ancient Greeks had of astronomy and compare it with the pitiful thing called by that name in American high schools to-day, despite the tremendous advances that have been made in the science since that time. The Greek class in astronomy studied the stars, the modern class studies a book about the stars. Who knows to-day the planets as they wheel in their courses? We know that there are observatories with powerful telescopes where astronomers can make out wonderful things about them, so we make out none of the wonderful things our unaided eyes will let us see. It is the experience of chemistry and physics over again. A little while ago we read about the experiments in a book without ever trying them; to-day laboratories have been put in every school. One of my school-masters was a specialist in mineralogy. When I read of the ledges that the glaciers had smoothed and polished, I asked him if the smooth and polished ledges of my home neighborhood were of this origin. He answered that those were things that were only found in Canada! Years later I went to that home of my boyhood to find a splendid glaciated ledge in my father's cellar. The laboratory of geography is all out of doors. Why not visit it? For geography this is to give the concept of the elements of land-form that make up the actual earth and the meaning of their symbolic representation in maps.

DON'T READ ABOUT LAND-FORMS, GO AND SEE THEM

Much of the difficulty of modern physiography lies in the reader's ignorance of the units of land-forms as realities, though many of them are abundant and easily recognized by a child. Rivers have been regarded as water flowing down hill mostly toward seas or lakes. Here is the handicap of my subject. If you have not gone out to examine rivers, real rivers in the real world of out of doors, how can I hope to win you to see what a river is like by merely telling about it? I should like and I ought to go out on the bank of a river with you and seek there to guide your attention. Everyone has seen rivers, it may be answered, all have looked at them and know how they behave. They have seen that as they have gone about the world on their own affairs. But it is not thus that nature is questioned. This river of the definition has smoothly drawn parallel banks between which the water flows steadily onward toward the sea. But the first river we come to has no such parallel banks: it is a succession of pools and rapids. It is not curious in this; it is not flowing over harder and softer rocks; it happens to flow over masses of homogeneous clay. In the pools the water is circulating slowly, always in part against the general course of the stream. Here the width is five or six times as great as in the narrows. The depth varies as much. Some of the water that has plunged into the pools rises again at the further border to escape down the next rapid. Not a small part of the water in our river at any moment is actually ascending. In a half mile walk the other day by the bank of a river I found the bank bathed for a third of that distance by water flowing upstream. These things that I have mentioned are not exceptional details. Go out to-morrow and look at the first stream that you encounter. It will certainly show you many or all of these features that I have pointed out. You cannot find the stream with parallel banks and water descending steadily toward the sea. Again it is a good chance you find the water muddy. If you could examine the stream bottom you would certainly find gravel, sand or silt traveling along all the time. How common those color names for the world's rivers: Blue Nile, Red River, Yellow River, Black River, Colorado River, River Rouge, Kara Su and Kizil Su, Rio Negro and the Niger. As for the stuff that travels along on the bottom note the sand and gravel sheets left on grassy flats beside the river when the floods of spring have subsided. Sometimes the river seems clear, but the nearest to a stream of water only that I know of is reported in the Upper Peninsula of Michigan and contains only traces of chlorine! There is good ground to regard the material other than water which the water bears along in one way or another as perhaps more significant than the water itself. The river is always in a valley; in the lower parts of that valley are always found deposits of the material excavated from that valley. They have come down in the stream. They constitute the soil on which dense populations of men live, but they are the gift of the rivers to men like the valley itself, the only inhabited part of the mountains. The broad valleys and picturesque gorges of Switzerland are no less the gift of sediment laden streams than are the plains of Belgium, Holland, North Germany, Hungary and Lombardy, spread out for the densest populations of Europe by the same rivers that won the sediment from the massive Alps. Men rarely live far from some running stream. A little river is better for class study than the Mississippi. The study of rivers is a very modern thing, what we know of them is still but little in proportion to the number of problems they present to us. But many bold features that characterize them and fix their great significance to men are easily illustrated in their presence.

CHILDREN WILL LIKE TO RECOGNIZE EARTH-FORMS

It may be in order here to put in a word of caution. I am not contending for more advanced work in elementary grades save only in the sense that much that is done there is mere dawdling and waste of time. I am ignorant in this matter of stages of developing mind, not absolutely ignorant, I have five children, but relatively. I should like to believe, however, what I am told that the high school age of the middle teens is the time to reason, the earliest fit-for-geometry age, and that it is preceded by a stage when it is better rather to attract the attention and drill the memory. This is the period in which most of the work in geography is to be done short of the high school or college courses in physiography. I understand further from President Hall that in the very earliest years, along in the first, second and third grades perhaps, mere showing, without putting a strain on the attention or memory is more in order. I would definitely try then to interest in the earliest years and never seek more than an emphasized association in the later years. I believe that children know nothing more interesting than the world of out of doors and this interest I would utilize. They tell me that children's first interest is in living things, for which reason geography is little adapted for nature work with the little ones. I find here, however, the best reason why geography is so admirably fitted to their needs: it is so very much alive if you take it in its out of door aspects and not its book forms, which are dead enough. I know a Massachusetts city of forty thousand people where, in my mind's eye I see a class of thirteen and fourteen year-olds dig away for an hour at a delta disclosed by the temporary draining of a mill pond, changing the course of the inlet stream by simply damming it and delightedly watching it cut little canyons and build new cones of detritus at its emergence. They did not seem to think the thing dead. I do not think their little brothers and sisters would have lacked interest. I am sure their minds would not have been strained.

GEOGRAPHY IS PROPERLY CONCERNED WITH THE ACTUAL FEATURES OF THE EARTH

Here my friend the geologist steps in and reminds me that really you know, all that is very interesting, but it belongs to geology rather than to geography, just as my friend the botanist will protest if I stop with my class to look at the grouping of some plants, pure plant geography of course. This is a realm of nature the botanists like so well in these days that they want to fence it off for theirs under the name of plant ecology. The fact is that geography is so uninteresting by nature in the opinion of some incompetent judges that any interesting thing should be at once transferred to some other realm of knowledge. I am not much disturbed by these protests of invasion. The delimitation of geography from other sciences is too difficult for a mere geographer. I must leave that for a school superintendent or a professor of psychology. Meanwhile, the world being made of a great variety of things little and big, far and near, I propose to use the little and near ones to give my student basal concepts for the great and far.

MAPS SHOULD BE SYMBOLIC OF THE REAL WORLD

For that is what it must come to presently. When we have grown intimate with our home river in drought and flood, in summer and winter, let us use it to build up concepts of Nile and Amazon. Most of the facts of distant places we must learn from maps. Here are other basal concepts to be got ready. Why is it so many of my students tell me that they are permanently turned round? That they have fixed notions about the north that do not accord with the behavior of the sun and will not for all they may do? I asked one of them how it came about and she said she thought it came from too much study of the map. I think it comes of too much map as mere map and too little recognition of the map as a symbol of actual regions. If the map of the home locality had been studied and used as the class went about the country itself, if they went about the country with compass in hand, and a compass is as much needed in a school as a dictionary; if they used that map and that compass however little, to locate and find the things they were interested in, be it the flowers, the birds' nests, the nut trees, the fishing and swimming places, the skating places or the other things dear to a boy's heart and good for a teacher to know about if she would only learn, the north would settle down into its place without more ado, and when the map of South America or Australia had to be brought out, those rolls would not *be* South America and Australia as they are too often to-day, but symbols distinctly aiding vivid conceptions of those distant lands. We Americans are not making what we might of maps. Some of the national departments at Washington are making beautiful ones, notably the Coast Survey and the Geological Survey. They are cheap too, cheaper than any other good maps made anywhere, but they are not much used by teachers, in part because they are not effectively advertised.

NOT LESS WORK IN GEOGRAPHY BUT BETTER WORK

President Hall would have us cut down the time given to geography to a fourth or an eighth of the present amount. These quantities differ enough to suggest that they are rhetorical and not to be taken seriously. If a fourth is the proper amount or even near it, an eighth would seem too little. If an eighth is about right a fourth is clearly excessive. Such a prescription can hardly come from a careful physician or one who has fully diagnosed the case. The sub-committee on geography of the Committee of Ten, including Americans distinguished for their geographical attainments the world over, admitted that the results now attained are not proportionate to the time they cost. They suggested observational geography from the start and went into valuable details in describing what they meant. They emphasized above all the need of teaching more geography to the teachers. There is a sense in which the teachers of geography to-day know less geography than the teachers of many years ago, and this is not wholly to be regretted, yet unaided forgetting is not satisfactory progress. The Committee urged in 1893 that an elementary course in physical geography be put in the last year of the grammar school, while physiography should be taught in the last year of the high school as soon as properly trained teachers could be obtained. This physiography I take it would differ from physical geography by using the strict logical arguments of geometry, physics and chemistry in the treatment of causes and effects. While such teachers could not be obtained a course in geology might take its place. Either of these courses to be given as advanced work with field work and laboratory work. They declared that without such courses as these "a serious danger threatens the whole line of geographic study in the schools, for the great mass of teachers of geography have not taken courses beyond the high school —and if they are not taught the elementary processes and principles of these sciences there, they will have little strength as teachers of gography. They cannot go much beyond mere facts and formalities." The committee thought in this way to utilize the time given to geography. This programme has been in print now for ten years. What has been accomplished? A year ago I made an investigation into the status of geography in the high schools of Michigan. While that state may not accurately reproduce the conditions of the country at large, it may fairly be called a representative state. One hundred and twenty-nine of the largest high schools of the state reported and the general conclusion I draw is that not a dozen schools in that great state are doing what was advised. The last year in the high school has physiography in but two schools and geology in only six. Only a third of the schools reporting did any out of door work and a quarter of them any laboratory work. Add to this that physical geography is not generally taught in our grammar schools and we have the net result that the course in physiography or geology is simply omitted and the grammar school physical geography pushed up into the first year of the high school. The mass of the teachers are still receiving no preparation for good work in geography. The Committee of Fifteen expressed its satisfaction with geography as of great educational value and made it a liberal time allowance in the suggestive programme it prepared. Sixty minutes a week of this time was allotted in the lowest two grades of school for oral lessons. If this weekly hour were given mostly to out of door work in the open weather of spring and fall, the best possible foundation could be given for later instruction on the regions of the earth. But it cannot be hoped to get the class ahead of the teacher. The teacher must be got out of doors first and taught to see. She will find there health and renewed strength for her daily task and a source of delight in the world about that she has never before suspected.

PHYSIOGRAPHIC CONTROL OF THE CHATTANOOGA CAMPAIGN*

BY FREDERICK V. EMERSON

AT the opening of the civil war, the leaders of both sides clearly recognized three regions around which important campaigns must center. The confederacy was at a disadvantage in having no marked natural boundaries. The rivers and mountain led *into* rather than *around it.* The territory of the seceding states was roughly divided into three physiographic sections, each of which required a separate force. East of the Appalachians were the Piedmont and Coastal Plain regions, the struggle for which centered in the vicinity of Richmond. On the west was the Mississippi Valley, the "gateway to the confederacy."

The middle section included the rugged portions of Kentucky and Tennessee. By a singular combination of surface features the key to all this area lay in the comparatively small region in the vicinity of Chattanooga. It is the purpose of this paper to trace the relations between the campaigns centering about Chattanooga to the topography of the region—their "earth control," as the geographers would say.

"Chattanooga," says Fiske, "was the northern gateway to the center of the confederacy. From it radiated railroads to the Ohio, Mississippi, Gulf and Atlantic; through it were the railroad connections of Virginia with the southwest. Its possession by the federal army would isolate Virginia and North Carolina from the western states of the confederacy, and open a way through Georgia to Atlanta and thence to the coast." On the other hand, its control by the confederates gave them the fertile valleys of east Tennessee and allowed them to threaten Kentucky and western Tennessee. They could readily move troops and supplies between the army in Virginia and the forces in the west. The mountaineers in Kentucky and Tennessee were largely unionists and this provided an additional strong incentive for the federals to control the region.

The importance of Chattanooga during the war and the cause of its industrial development since are largely due to physiographic and geological influences. Within a space of a few miles three different geological structures, each having a characteristic physiographic development, approach each other.

Taking these regions in order, the first to the eastward is the Appalachian. It is an apparent jumble of peaks, ranges and valleys, as a glance at the relief map will show. Their ancient crystalline rocks have weathered with comparative slowness, and consequently the mass stands out in strong relief, extending nearly to the Atlantic and most effectively separating the southern Atlantic seaboard from the interior. So effective a barrier were they that communication from the coastal plain with northern Georgia, Tennessee and Kentucky was either by the passes in Virginia or around the southern end of the mountains by way of Atlanta. Prior to 1880 there was no railroad across these mountains south of Roanoke. Some of the intermontane valleys are fertile and support a considerable population, but the general inaccessibility of the region is shown by the life and customs of the people, which have scarcely changed since Revolutionary times.

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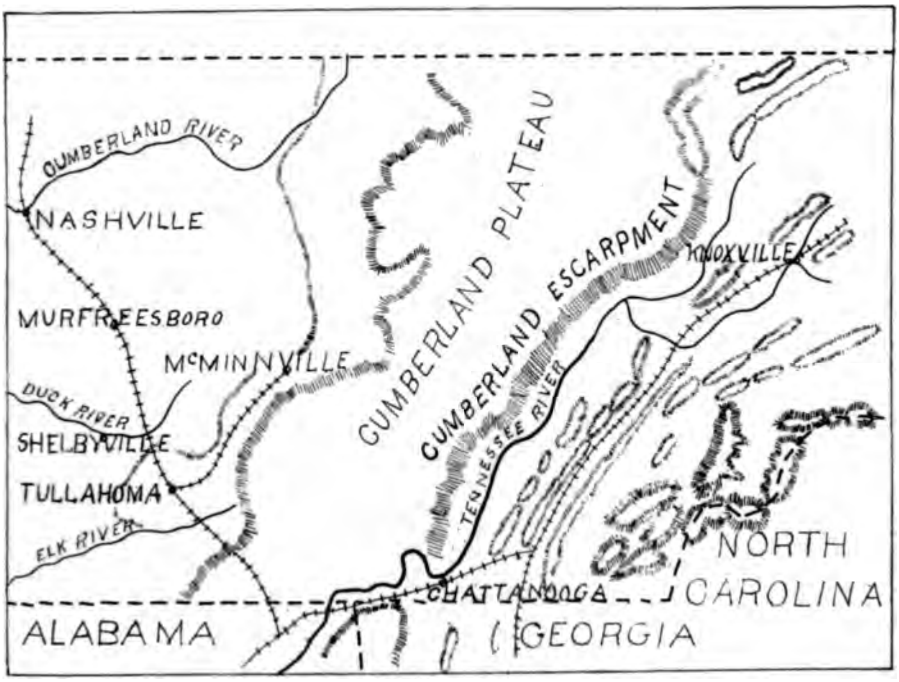
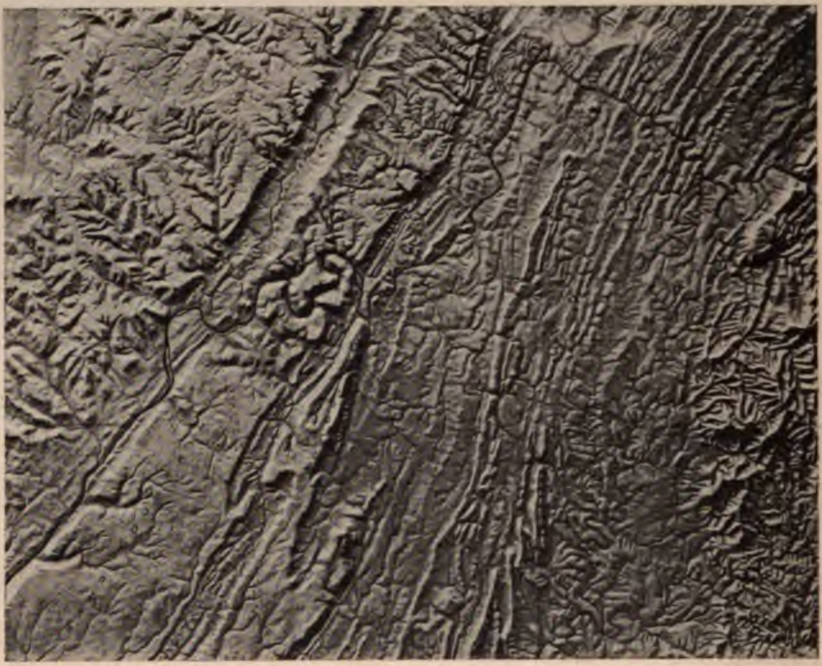


Outline Map of the Region included in the Chattanooga Campaign

In the tilting and folding incident to the formation of the Appalachian system, there was exposed a belt of limestones and shales extending in a direction roughly parallel to the mountain axis. These rocks are tilted and their upturned edges are easily eroded as compared with those on either side. The result of this erosion is an irregular trough from ten to seventy-five miles wide and over a thousand miles long. It is known in general as the

"Great" or Appalachian valley, but has various local names. In New Jersey it is known as the Kittatinny valley; in Pennsylvania it is the Cumberland valley; in Virginia it becomes the Shenandoah valley and in this region, the Tennessee valley or the East Tennessee valley.

The rocks are much inclined and their parallel edges of different degrees of resistance are exposed to the process of denudation, the results of which are long, narrow, parallel ridges running lengthwise along the valley. For example, the famous Chickamauga Ridge is composed of a compact resistant rock, known as Knox dolomite, which stands above the valley floor because the neighboring strata are less resistant to the levelling effects of denudation. The traveler going through the region is not likely to recognize the valley form, as most of the roads are in smaller valleys between the ridges, but once gain some commanding elevation and the great valley is seen stretching away, its ridges and hills melting into insignificance on its apparently level bottom. The decomposed rock makes a fertile soil which early attracted settlers. From New York to Alabama it is the abode of a prosperous people with well tilled farms and comfortable homes.



Relief Map of the Chattanooga District. (Photographed from the model by E. E. Howell.)

Extending westward from the valley is a plateau region which merges on the north and west into the Mississippi valley and is known as the Cumberland Plateau. The geologist finds no difficulty in accounting for the transition from valley to plateau when the rock arrangement is seen. Here instead of the highly tilted strata of the valley, the rock layers are nearly horizontal. Instead of the troughs and ridges of the valley, the surface, while rough, has an even sky line which tells of a former approximately level surface. The elevations are steep and the streams seem to have no regular arrangement—in short, this region is a "dissected" plateau. The surface stratum of rock in general is a sandstone which is underlaid by a stratum of more easily soluble limestone. When a stream has cut through the sandstone layer and reaches the limestone, it deepens its valley more rapidly than before and consequently flows in a steep trench.

General view showing one of the Appalachian Valley Ridges in Monroe County, Tenn.
(Photographed by the U. S. Bureau of Forestry.)

The overlying sandstone protects the limestone beneath and prevents its active weathering, thus the rate of recession of a cliff is entirely regulated by the recession of the overcapping stratum. The general result upon the topography is high, cliff-like valley walls, and rather level-topped hills with steep slopes. Where the plateau meets the Great Valley, this is shown on a grand scale. From Chattanooga northeastward along Walden's ridge for scores of miles stretches a cliff or escarpment which overlooks the valley. It is steep and the streams flowing across the escarpment have gashed it into a serrate profile which gives it the local name of Cumberland Mountain. The lack of roads and general inaccessibility of plateau and escarpment made it a factor to be reckoned with in the movement of armies. The plateau is heavily timbered and, in contrast with the valley, is difficult of access and sparsely settled. The relief map of the Chattanooga district shows the surface appearance of these divisions.

The drainage of these regions is as peculiar and characteristic as are the surface features. The great valley is a structural valley, and not, as are most valleys, the seat of a great river. Its existence, as has before been noted, is due not to river activity, but to the easy denudation of its rocks as compared with those on either side. The only large rivers flowing lengthwise of the valley are the Shenandoah and Tennessee. These and the smaller streams have a general direction parallel to the valley trend. They have discovered strata which they can erode and into which they have sunk their channels. The streams on the plateau have no such succeeding parallel strata to guide their course and have cut valleys in an irregular fashion, not unlike the branching of a tree.

Looking at the course of the Tennessee, it would seem that the river could hardly have taken a more roundabout way to the sea. Rising about seventy miles above Chattanooga, it follows the valley trend until it reaches this place. There, instead of continuing about three hundred miles down the valley to the Gulf, the river turns abruptly to the westward and enters the plateau by a deep gorge. Flowing in a meandering course, it passes through northern Alabama and across Tennessee and Kentucky, entering the Ohio River at Paducah, over fifty miles north of its source. It finally reaches the Gulf after a circuitous journey of more than three times the distance that would be required had it taken the course down the valley. Indeed, some geologists hold that the Tennessee at one time did follow the shorter course, but a tilting of the land together with the rapid erosion eastward of a westward-flowing stream diverted the river to its present course.

The civil war opened with the Chattanooga region in the hands of the confederates who also controlled Tennessee and Kentucky to the north and west. Both sides were fully alive to the importance of the position and for over two years it was the objective of the union armies. But at this time Chattanooga was nearly one hundred miles within the confederate lines, which reached from Columbus, a strongly fortified post on the Mississippi, to Cumberland Gap, at the northeast corner of Tennessee, where there was a pass to the Great Valley. At about the center of the line were forts Donelson and Henry, which commanded respectively the Cumberland and Tennesee rivers. These rivers were natural roadways into the confederacy, and it was an important step when Grant captured the forts. The first advance toward Chattanooga had been taken, and from now on until its capture Chattanooga was the goal of some Union army in Tennessee.

View in the dissected Cumberland Plateau, near Sewanee, Tenn. The Mountains, are formed by denudation, leaving an even sky-line. (Photographed by the U. S. Bureau of Forestry.)

General Rosecrans was in command of the army which found itself ready to start for Chattanooga, with General Bragg as his opponent. Bragg had attempted an invasion of Kentucky, but was checked at the battle of Stone River, near Murfreesboro, which left the two armies facing each other on the Cumberland plateau. Rosecrans's army and supplies were concentrated at Murfreesboro and Bragg had his center resting at Tullahoma, a straggling village important only as a railroad junction. The Tullahoma campaign which now followed was indecisive, but is interesting to the student of military history because of the strategy by which Rosecrans forced his adversary to retreat without incurring serious loss to the federal army. Its consideration is also appropriate in this article, since the plans of the commanders and the movements of their forces were very largely controlled by the physiography of the plateau.

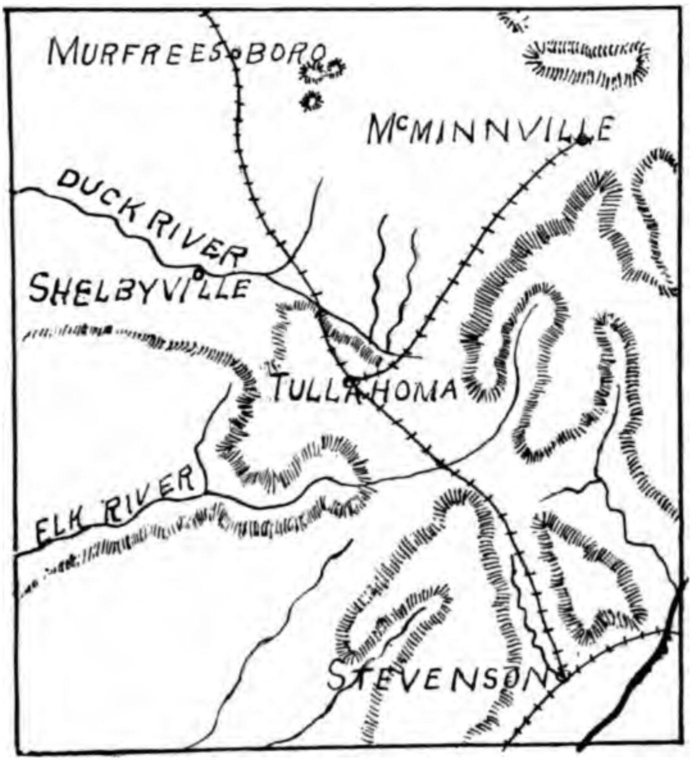
So deeply dissected is this plateau that, without exception, military writers speak of it as the Cumberland "Mountains." Weathering and stream work, continued through untold ages, have cut deep valleys and carved hills until we have the present rough country to cross which, even without an enemy in front, was no small undertaking. The soil, derived from carboniferous sandstone in general is a thin sandy loam, and only in the valley bottoms where the streams have worn a trench and partly filled it with alluvial sediment is the soil fairly fertile.

The plateau with its overlying sandstone is believed once to have extended across middle Tennessee, but active erosion in the vicinity of the larger rivers has removed all but a few remnants of the sandstone and left the underlying limestone to form the floor of the middle Tennessee basin. The Cumberland Plateau is therefore a surviving portion of this old extensive plateau. It is commonly known as the Highland Rim.

The plateau descends towards the plains of middle Tennessee by three great irregular terraces each roughly about five hundred feet high. Through these terraces streams have carved narrow valleys through which the roads pass to the lowlands. These gorges, called "gaps" by the mountaineers, were as important to the armies in that section as were the "wind gaps" between Virginia and the Shenandoah valley to the confederates. They were easy to hold with a small force against a numerous body of the enemy and were especially serviceable to a retreating army, since a small rear guard was able to give complete protection.

The question of railroad transportation was an almost paramount one in these campaigns and, as we have seen, was one of the reasons for the military importance of Chattanooga. The modern army with its concentration of men and horses is rarely able to live on the country through which it passes, especially if it is on an offensive campaign and traversing territory through which the enemy has passed. To do so would involve the spreading of the troops over a large area or detaching a considerable force to forage. Sherman's famous march to the sea was a successful instance of a large army living on the country, but he had no active enemy in his front and was passing through the "garden of the confederacy." If a railroad or river is not available for transporting supplies, resort must be had to wagon trains.

The average army wagon was drawn by six mules and carried a day's rations for five hundred men. If the distance were such that the wagon could not make a complete trip in one day, more wagons were required. It was even harder to provide food for the horses. When cattle could be driven it would give some relief to the wagon trains. To give a general idea of the magnitude of this work, it is estimated that it required one thousand wagons and six thousand horses to feed an army of fifty thousand men when they left the railroad or base of supplies for a distance of two days' march. This estimate assumes good roads and no breakdowns or stoppages by the enemy and does not include transporting the sick and wounded or the ammunition and materials of war.

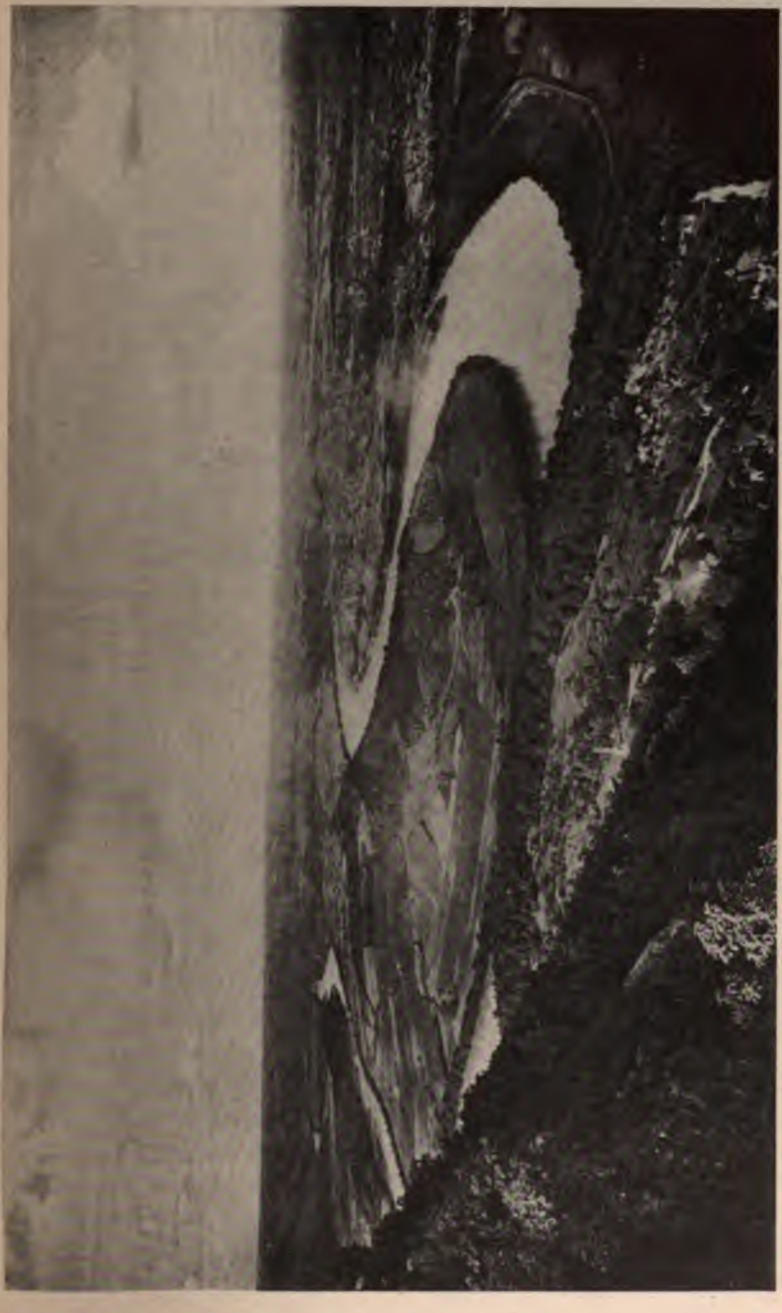


The Region about Tullahoma.

The Louisville and Nashville railroad winds through the plateau following the valleys which the streams have cut. It crosses many streams and deep gorges by wooden bridges which were easy to destroy and difficult to rebuild. Both armies were dependent on this road for their supplies. About Tullahoma the soil, before it was cleared, supported a growth of pines and from the general inhospitality of the region was known as the "Pine Barrens." The soil drainage was so easy that in a dry summer there was scarcity of water on the uplands, but in a rain, as one of the federal officers complains, "The soil became as quicksand after a rain, allowing artillery and wagons to sink to the hub." Thus the dependence of the two armies upon the same line of railroad was almost absolute.

The Tennessee breaking by a Steep Gorge through the "Mountains." Owing to the swift current it is there called the "Suck."

After the battle of Murfreesboro, Bragg's policy was one of defense. His position was strong and well taken. His center and depot of supplies were at Tullahoma, where he had thrown up extensive intrenchments. His left was at Shelbyville on the plateau, about thirty miles to the northwest in the Duck River valley. This town was in a fairly fertile alluvial valley which offered some sustenance for the troops and horses and, further, was a center from which roads diverged in all directions. Moreover, if he were forced from his position, he could retreat to the plateau which could be fairly easily defended. To his right from Tullahoma, Bragg had posted bodies of troops for the double purpose of defense and of threatening the



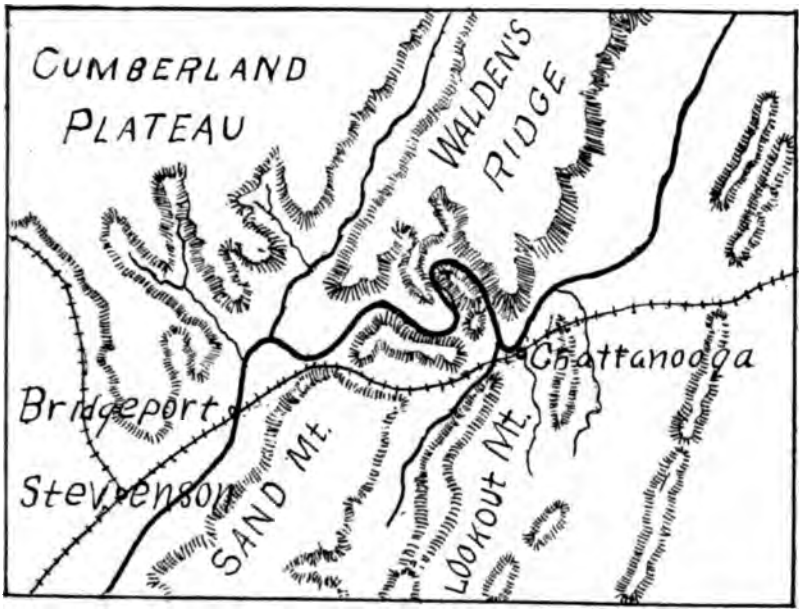
Moccasin Bend from Lookout Mountain. Chattanooga is seen in the middle ground. The long even sky-line to the left is the plateau escarpment. The small plateau on which the battle of Lookout Mountain occurred is in the immediate foreground.

union base at Murfreesboro. His defensive positions were taken where streams passing from one terrace had cut gorges through which roads passed to the plateau, the most important being Hoover's Gap and Liberty Gap. Bragg believed that he had sufficient men in this vicinity to guard the narrow defiles through which most of the roads ran.

Without going into detailed accounts of movements of troops, Rosecrans's plan may be briefly stated. Realizing the strength of Bragg's left at Shelbyville, the Union general resolved to attempt what his opponent evidently considered well-nigh impossible—to get his forces on Bragg's right in such a position as to threaten the latter's line of communication and compel him to evacuate his strong position.

A strong Union force with several days' rations in wagons and *on hoof* was detached for this movement. A vigorous attack on Bragg's left partly concealed the plan of Rosecrans and prevented him from sending reinforcements from here. The movement was successful and the defiles or "gaps" were secured by which the troops could pass to the level of the plateau on which Tullahoma was situated. The confederate general, not waiting for his line of supplies to be destroyed, retired to the Tennessee, burning the bridges and destroying the railroad as he went. A pursuit was attempted which was entirely ineffectual. Again the narrow stream gorges were an important factor. The passage of the confederate army had left the roads almost impassable and their rear guard had little trouble in defending the defiles through which their columns had passed. Bragg crossed the Tennessee and leisurely led his army into Chattanooga.

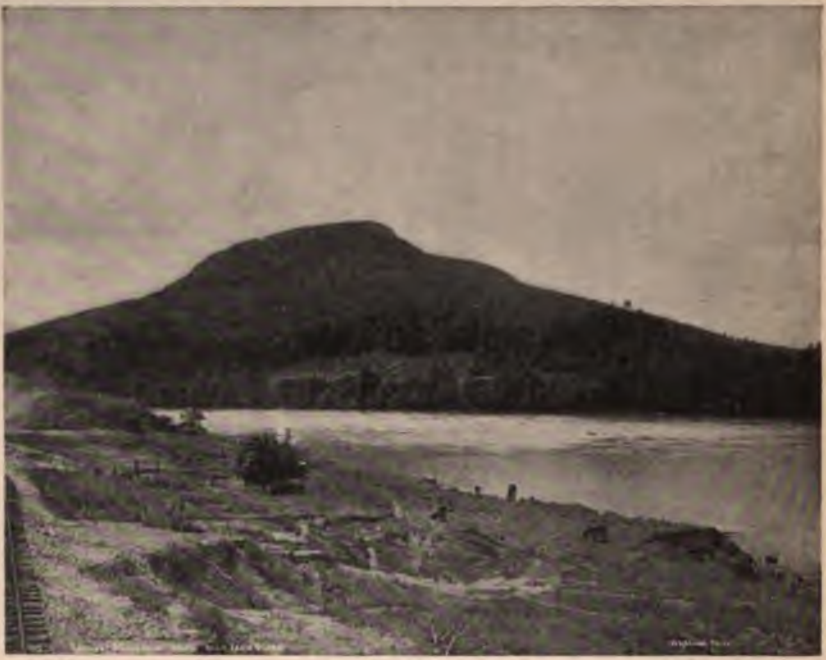
At this stage the immediate topography of Chattanooga and its vicinity became important in determining the military movements. Looking at the relief map it will be seen that the city lies at the western side of the Great Valley close to where the river breaks into the plateau. It winds through Sand Mountain in a deep gorge which narrows in places, making the current so swift that an ordinary steamboat could not ascend without aid from teams or men on the shore. When the river reaches a long, narrow trough, called the Sequatchie valley, it takes this easier path and flows sixty miles before again crossing the plateau in its indirect course to the Ohio. Near the city the river flows to Lookout Mountain and then doubles on itself, flowing northwesterly, almost parallel to its course, for several miles. This is the famous Moccasin bend, so called, of course, from its rough resemblance to an Indian's moccasin. At the apex of the bend towers Lookout Mountain, the most conspicuous feature of the vicinity. Geologically it is a part of the plateau from which it is separated by a narrow erosion valley. It is capped by a sandstone stratum which slopes to the south, where it finally merges into the general level in Alabama. Its bold profile against the sky at once attracts the eye, and the name is decidedly appropriate, since on a clear day several states can be seen from the summit. The ridge, for so it must be called instead of "mountain," rises in slopes so steep that they were insurmountable by an army, while its summit is fourteen hundred feet above the rapid current. A mile or so eastward is Missionary Ridge, roughly parallel to Lookout, but much lower and more accessible. Its top is really a succession of hills or knobs. Between these ridges is Chattanooga Creek, which enters the Tennessee near Chattanooga.



Vicinity of Chattanooga.

Still to the eastward of Missionary Ridge is the famous Chickamauga Creek. Looking westward from Lookout summit, the view is wild and picturesque in the extreme. Extending to the base of the mountain the valley of Lookout Creek is seen in the immediate foreground. Beyond that is the rough Sand Mountain, whose name tells the story of its rock structure and suggests its scraggly covering of trees and shrubs. To the northwest the river winds in its narrow gorge in the plateau for a few miles and disappears around Sand Mountain. North of the river Sand Mountain is continued and known as Walden's Ridge.

Returning to the military movements, we find Rosecrans on the Cumberland plateau, in the vicinity of McMinnville. For some time he was busy repairing the seventy miles of railroad leading from Murfreesboro towards Chattanooga, which the conferedates had destroyed in their movement southward. Some of the bridges of this road were destroyed and rebuilt four times in the course of the war. The Chattanooga and Nashville railroad passed to Stevenson, a small town about thirty miles down the river from Chattanooga, where it joined the railroad leading from Chattanooga to Memphis on the Mississippi. Stevenson was the federal base of supplies. The road then crosses the river at Bridgeport, crosses through a ravine, a spur of Sand Mountain into Lookout Valley, and thence passes around the northern end of Lookout Mountain into Chattanooga. To protect this line Rosecrans was obliged to detail thousands of his troops; each bridge was guarded by a detachment of soldiers who generally had built a stockade in the vicinity. The country was swarming with detached bands of hostile "guerillas" who would wreck a train or burn a bridge and then escape.



Lookout Mountain from the Bank of the Tennessee River. Hooker's forces ascended the north slope and the battle took place on a small plateau or shelf, seen about half way up the mountain.

The Union commander had open to him two approaches to Chattanooga. He could advance over Walden's Ridge directly upon the city, but this route was beset with difficulties. The roads were very poor and led over the hilly, wooded plateau. After a rain they speedily became impassable to wagons. His base of supplies and nearest railroad point was at Stevenson, from which he would be compelled to haul supplies for the army in the presence of an enemy well supplied with cavalry; moreover, he would have to cross the river in boats at Chattanooga in the face of a vigilant foe. In spite of its difficulties this was the way which Rosecrans was generally expected to take, as it was thought that Burnside, who was near Knoxville, up the valley, would come down and join in the movement.

The other approach lay along the river valley and across Sand Mountain. The advantage of this route was that the army was near its base of supplies, with which it had both river and railroad connection. However, the roads were poor and the route lay across parallel ridges, almost inaccessible except in a few places. It would be hard to maintain a compact advance over the rough country, and a regiment of the enemy could easily delay an army. Rosecrans chose this route and the manner in which he maneuvered his army was certainly a brilliant piece of strategy.

Bragg had expected the federal army to come over Walden's Ridge, and Rosecrans did all in his power to strengthen that belief. Troops were deployed in front of Chattanooga and at night camp fires were lighted on the hills above the river. By feinting in this way Rosecrans was able to advance his army into Lookout Valley without encountering opposition. From here he went through the passes of Lookout Mountain into Chattanooga Valley and threatened Bragg's line of communication with the south. Bragg led his army out and, after a series of maneuvers, the battle of Chickamauga was fought with disastrous results to the federals. Had it not been for the stand made by Thomas, the "Rock of Chickamauga," the Union army would have been routed. As it was, they were driven into Chattanooga and imprisoned by a seemingly impregnable line of works. Lookout Mountain was abandoned and at once occupied by the confederates. It was apparently the key to the situation.

Rosecrans had caught the wolf by the ears. He had gained Chattanooga, but was a prisoner in its outworks. To advance against the strongly entrenched enemy was folly. To retreat across the plateau would have demoralized his army besides losing the position he had won at such cost. Worst of all, the enemy had taken possession of Lookout Mountain, which Rosecrans had felt obliged to abandon. They had fortified the position and placed guns which commanded the river and railroad west of Chattanooga, thus cutting off supplies from that direction. For awhile provisions came over the Cumberland plateau, but the hardships of the route soon exhausted the teams which could not follow the river, as that was patrolled by the enemy's pickets, and were obliged to take circuitous roads over the hills and away from the river. The cattle that were driven that way were hardly able to stand alone, much less furnish sustenance. The soldiers with grim humor spoke of them as "dried beef on the hoof." Bragg, confident of his game, sat down and waited for the Union army to be starved into surrendering, and his hopes did not seem unreasonable.

The north was thoroughly alarmed at this state of affairs and Grant was put in command. His first work was to open a line by which supplies could reach the city. The celerity with which he accomplished this makes one wonder why it was not done before. The only feasible route was up the river, but the works on Lookout Mountain controlled both the river and the railroad west of the town. Down the river and out of range of the guns on Lookout was Brown's ferry, which was guarded by a force of confederates. Hooker's division, which had been brought from the east, was thrown across the river and, capturing the force there, entrenched a position commanding the river, which was now clear below this point.

The famine in Chattanooga soon ended. Supplies came to Bridgeport, from thence to Brown's ferry, which Hooker was guarding, and then by wagon to the army. The soldiers were soon well fed and clothed by the "cracker route," as it was appropriately called.

Grant was now free to develop offensive plans. It will be remembered that Bragg's lines stretched from his left on Lookout Mountain to Missionary Ridge, where his right was strongly entrenched; Thomas was to threaten the confederate center, Sherman was to attack heavily on Missionary Ridge and Hooker was to move on Lookout Mountain and the enemy's left.

The latter's movement in the celebrated "battle above the clouds" was successful. However, since the establishment of the new line of supplies, Lookout had ceased to be the key to the position. Sherman found the opposing works stronger than he expected and he was not immediately successful. However, in the center the unexpected happened. This position was believed to be too strong to be carried by direct assault and the attack was intended to prevent reinforcements being sent against Sherman. The troops had orders to stop at the first rifle pits, but they could not be restrained. They rushed up the steep slope, carried the position and the confederate center was broken. Bragg was badly beaten and withdrew to Dalton. The region was not out of Union hands during the rest of the war.

Chattanooga's importance has not ceased with the close of the war. Its position at the gateway between the grain and cotton states, together with the resources of the surrounding country, makes the location of an important city in this region almost inevitable. Since the war, the river has been made navigable most of the year to the Ohio. Railroads have multiplied and eleven lines enter the city. Iron, coal, limestone, cotton, lumber, grain are near at hand in the valley and plateau. The city's population and manufactories have doubled in a few years. The battlefields in the vicinity have been surveyed and mapped and the Chattanooga and Chickamauga parks rank with Gettysburg among the military parks of the world.

At a point near Chattanooga one can view the two aspects of the place without changing his position. In the beautiful national cemetery rest over twelve thousand veterans of '63. Turning a little, the city is in view. Its factories are a prophecy not only of the city, but as well of the New South.

COMMERCIAL JAPAN IN 1904

Japan and its relation to the territory bordering on the Pacific Ocean is the title of the map. Comparison of this with a good physical map of the Empire brings out the geographic reasons for the distribution of tea and rice-growing. The next treatment is semi-historical, beginning with a brief statement of the earlier commercial relations and then taking up the present conditions. Japan's reliance upon the United States for certain commodities, notably cotton, illuminating oil and iron and steel, is shown to be mainly due to geographic conditions, while her exports to America, especially silk, tea, matting, bamboo and lacquered ware, are commodities which we are unable to produce. A trade thus based on geographic differences must be fairly enduring and mutually beneficial.

Foreigners in Japan, to the number of 11,684, are mostly classed as merchants and men of other professions. Of the Japanese in other lands 72 per cent., or 90,146, reside in the United States, and about 30,000 more are in Oriental lands, Korea, China, Russian and English colonies. Thus a very small per cent. of the Japanese with foreign residence are in Western countries other than the United States. Both the export and import business of Japan are conducted largely by resident foreigners. A good article, treating of the effects of Japan's commercial development on her civilization, and prepared by a Japanese student in America, will be read with interest. The monograph discusses the more important trades and industries as to their present condition and prospects. Elaborate statistical tables of actual conditions and comparative growth in production and commerce constitute at least one-third of the publication.—*Bull. Am. Geog Soc.*, January, 1905.

TRANSPORTATION—PART IV[1]

BY J. T. HOLDSWORTH
Drexel Institute, Philadelphia, Pa.

COMBINATION PERIOD 1870-1898.

AFTER the Civil War the country enjoyed a long period of almost unbroken prosperity, marked by great economic changes, and especially by the unprecedented development of internal commerce and transportation. The vast reaches of agricultural and grazing lands of the Trans-Mississippi West were settled, and mining towns began to spring up along the great treasure-house of the continent, the Cordilleras. "Capitalists, confident of the growth of the country, and assisted by the generous aid of the United States and from the local governments and individuals of the section to be served, constructed railroads for the purpose of creating the traffic upon which the earnings of the road must depend. In many cases the railroads built during the twenty years following the Civil War were pioneers entering unsettled regions beyond the Mississippi and Missouri rivers, and opening highways by which immigration was able rapidly to occupy the prairies and mountain valleys of our great West."[2] The panic of 1873 was largely the result of this too hasty projection of railroads and their heavy over-capitalization. Yet by 1880 the lessons of '73 were forgotten and in the following decade 70,000 miles were added to the railway net. "Within ten years the people of the United States built as many miles of railroads as the people of the three leading countries of Europe had constructed in fifty years."

During this period of rapid growth, the railroads were pretty generally a law unto themselves in the construction and operation of their lines. Little or no control, regulation or supervision was imposed on them—the country clamored for railroads. "To such an extent was the public mind prepossessed in favor of railroads that any legislator who would have been instrumental in delaying the granting of a railway charter for the purpose of perfecting it, to protect the people against possible abuses, would have been denounced as a short-sighted stickler and obstructor of public improvements."[3] Under such circumstances it was but natural that abuses should spring up. Discriminations, rate wars, pooling, and other disturbing features developed in railroad management. In the new West, especially, the people were long-suffering, but in the years following the close of the Civil War, railway abuses became unbearable. In several of the grain states, Illinois, Iowa, Wisconsin and Minnesota, granger legislatures passed laws seeking to regulate railroad rates and service. The railroad companies contested these "granger laws," but in 1877 the Supreme Court of the United States declared them constitutional, and the railways were compelled to submit to the regulation of the state.

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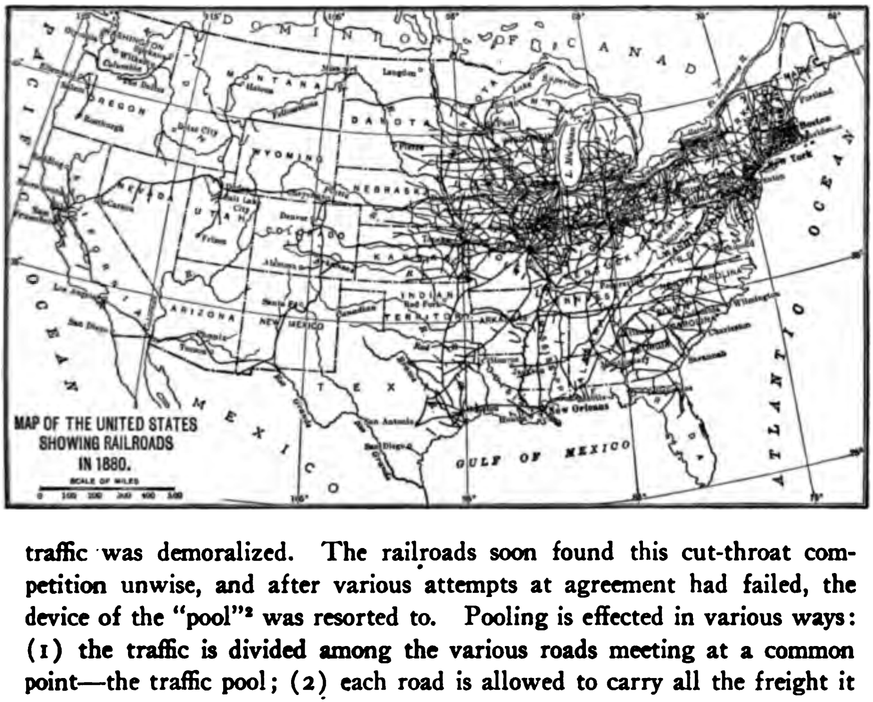
[1] Continued from Vol. III, p. 420.
[2] Johnson, p. 28.
[3] Larrabee, p. 125.

Scarcely less serious abuses had arisen in the East. In 1874, there were five roads competing for the business between Chicago and the Atlantic ports—the Pennsylvania, the New York Central, the Erie, the Baltimore and Ohio, and the Grand Trunk. During the next two years violent rate wars ensued, through rates were cut to pieces on all the trunk lines, and traffic was demoralized. The railroads soon found this cut-throat competition unwise, and after various attempts at agreement had failed, the device of the "pool"[2] was resorted to. Pooling is effected in various ways: (1) the traffic is divided among the various roads meeting at a common point—the traffic pool; (2) each road is allowed to carry all the freight it can get, then the total earnings of all the roads are divided according to agreed ratios—the money pool; (3) the territory is divided, each road being apportioned a section of country within which it enjoys exclusive control of the freight business. All three of these forms of pooling have been resorted to by American railway managers at some time or other. The end sought by the third form of pooling noted is gradually being brought about, without any formal agreement, through the grouping of our railroads into a few


MAP OF THE UNITED STATES SHOWING RAILROADS IN 1880.

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[1] For Pools and Traffic Associations, see Johnson, ch. 16; also, Langstroth and Stilz, Railroad Coöperation.

great systems, each of which practically controls the traffic of a great region of the country.

The first regular pool of consequence in the United States was established in 1870 by the three roads connecting Chicago and Omaha—the Burlington, the Northwestern and the Rock Island. This pool, providing that each of the lines should have a third of the business, was so well organized that it lasted, with but one slight break in 1882, for fourteen years. Pooling agreements increased rapidly during the next ten years. In 1876, the Southwestern Railway Rate Association was formed to regulate competitive traffic between Chicago and St. Louis and points on the Missouri River. Similarly, the Northwestern Traffic Association controlled the traffic between Chicago and St. Louis on the east and Omaha and Council Bluffs on the west. West of the Missouri River various associations of a similar nature sprang up.

Many of these later organizations had activities other than the pooling of earnings or traffic. They "fixed the rates on joint and competitive business, laid down rules regarding the solicitation of traffic, took measures to prevent fraud, determined the speed at which the fast passenger trains should run, decided what kind of tickets should be issued, and what privileges should be afforded or denied shippers. Until 1887, a pooling agreement was a regular feature of the organization of all traffic associations; since then pooling has been illegal, but the traffic associations have continued to exercise their other functions."[1]

Though attempts had been made to secure agreements among the rival trunk lines, notably in the case of the Saratoga Conference in 1874, it was not until 1877 after three years of ruinous rate wars that the railroads concerned effected a coöperative organization. In that year, under the able guidance of Albert Fink, chairman of the Executive Committee of the Trunk Line Association, an agreement was reached by which the New York Central and the Erie were each given 33% of the west-bound traffic from New York, the Pennsylvania 25% and the Baltimore and Ohio 9%. Two years later Mr. Fink secured the establishment of the Joint Executive Committee, composed of representatives of the trunk lines which sought among other things to adjust the delicate problem of "differential"[2] rates between the various seaboard cities and the West. Most pooling agreements had attempted to control rates only between common shipping centers. But in the trunk line territory the rival roads terminated at different points—Boston, New York, Philadelphia, Baltimore. With the gradual diversion of the traffic of the Erie Canal to the railroads the supremacy of New York was menaced by these other seaboard cities. The situation became still more complicated when Baltimore and Philadelphia demanded lower railway rates from the interior to equalize the difference in ocean rates to Liverpool. Naturally, each trunk road sought to build up the business of its seaboard terminus, and as has been noted, reckless rate wars followed. Finally the differences between the four important coast cities were adjusted by an agreement, April 5, 1877, which gave to Boston and New York the same rate from points West, to Philadelphia a rate slightly lower, and to Baltimore one still lower. These differential rates, or modifications of them, have obtained ever since, though the greatest dissatisfaction exists.

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[1] Johnson, p. 232.

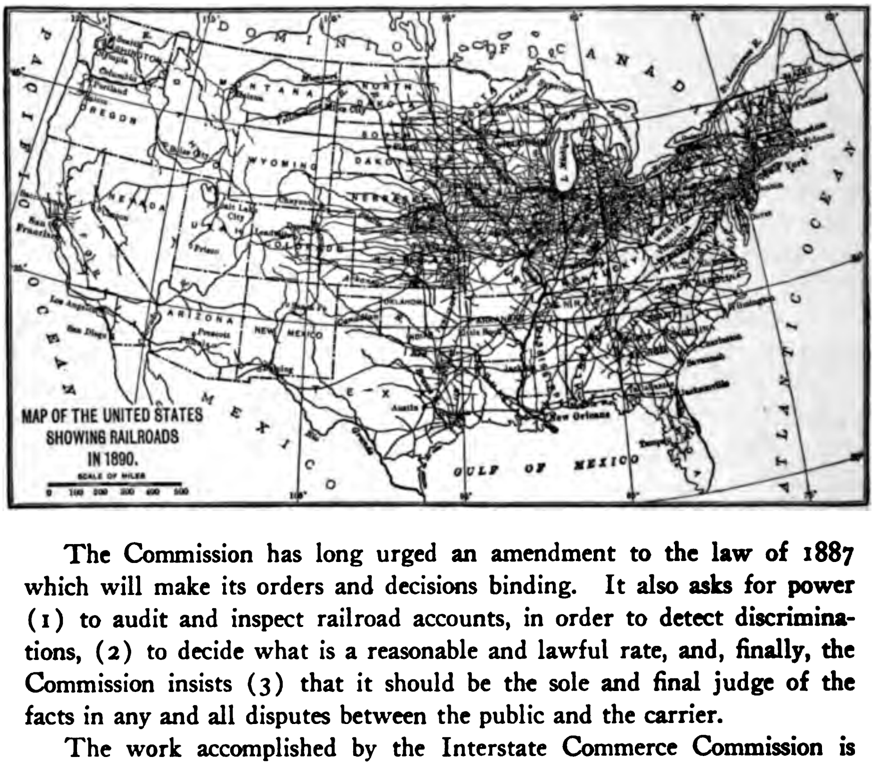
[2] For good discussion of the problem of differentials, see "Trunk Line Traffic and Differential Rates," Monthly Summary of Commerce and Finance, Department Commerce and Labor, April, 1904.

During the seventies and eighties, the tide of opposition to pooling and other supposed abuses steadily rose, and finally the demand for railway reform culminated in the enactment by Congress of the Interstate Commerce Act 1887. The most vital clauses of the statute are the following: Section one states the scope of the measure. It is to apply to common carriers engaged in transporting passengers or freight wholly or in part by rail under arrangement for a continuous carriage from one state to another or from the United States to any foreign country. This section states, also, that charges must be reasonable. Sections two and three prohibit personal and local discriminations. Section four, the famous "long and short haul clause," is an amplification of the two preceding sections, and especially prohibits that form of discrimination by which the charge is greater for a shorter than for a longer haul over the same line, in the same direction and under substantially similar circumstances and conditions. Provision is made for the suspension of this rule in special cases. Section five, "the anti-pooling clause," prohibits pooling of freight or earnings. The sixth section provides for publicity of rates. Section eleven creates the Interstate Commerce Commission to administer the law. The Commission consists of five members appointed by the President for a term of six years, not more than three to be chosen from the same political party.

The administration of the Act for nearly twenty years has revealed many weaknesses and defects in the statute. Decisions of the courts have shorn the Commission of much of its power, and since 1897 it has "possessed no effective power to adjust railway charges." Congress has remedied some of these defects by amendatory legislation. Under the terms of the original statute the penalties for violation of the law provided for in sections eight, nine and ten were applicable not to the corporation but only to the officer or agent guilty of the violation. The Elkins law of 1903 provides for the punishment of the corporation as well as its agents or officers.

It also makes the acceptance of a rebate or discrimination a misdemeanor equally with the offer. Moreover, it revoked the imprisonment penalty and makes all misdemeanors punishable by fines ranging from $1,000 to $20,000.

The Commission is empowered to hold hearings, make investigations, order carriers violating the law to desist from their illegal practices, and award damages to be paid to the victims of these illegal acts. But the power of the Commission is greatly restricted because its orders do not have the binding effect of a court decree. If a carrier chooses to ignore the order of the Commission, obedience can be compelled only through an appeal to the United States Circuit Court.



MAP OF THE UNITED STATES SHOWING RAILROADS IN 1890.

The Commission has long urged an amendment to the law of 1887 which will make its orders and decisions binding. It also asks for power (1) to audit and inspect railroad accounts, in order to detect discriminations, (2) to decide what is a reasonable and lawful rate, and, finally, the Commission insists (3) that it should be the sole and final judge of the facts in any and all disputes between the public and the carrier.

The work accomplished by the Interstate Commerce Commission is summarized by Professor Johnson thus: "Although the ability of the Commission to accomplish its main purpose—the adjustment of rates and fares—has been greatly restricted by the narrow scope given by the Supreme Court to the act of 1887, the Commission has nevertheless brought about several important results: (1) Publicity of rates has been secured, and the public knowledge of railway affairs has been increased by the excellent statistics collected and published; (2) the interstate commerce law has been of service in reducing the number of freight classifications of the country; (3) by its informal as well as its formal investigations the Commission has done much to bring about a better adjustment of railway charges, as between different localities, different commodities, and different shippers; (4) the work of the Commission has been of great educational value. Its reports have considered in a clear and comprehensive manner the important phases of the railway question as they have presented themselves year by year, and its decisions which now comprise over eight volumes, have developed a serviceable and valuable administrative code regarding railway regulations."

After pooling was prohibited by the Interstate Commission Act the railways fell back upon the traffic associations to regulate their competitive relations. Among the strongest of these associations were the Trunk Line Association in the East and the Trans-Missouri Freight Association in the West. In 1896 the Trunk Line and the Central Traffic Associations were united under the name of the Joint Traffic Association, whose Board of Managers composed of representatives of all the important systems involved, practically fixed the rates to be charged by the several railroads. In 1898, this association was declared illegal on the ground that in effect it violated the anti-pooling section of the Interstate Commerce Act, and also, that being a "combination in restraint of trade" it contravened the Sherman or Anti-Trust law of 1890. Similarly, the efficiency of the Trans-Missouri Freight Association as a regulator of the inter-railway relations was destroyed by an adverse decision[1] of the Supreme Court in 1897, which held that an agreement among competing railways to maintain rates, whether reasonable or otherwise, was a restraint of trade, and hence a violation of the anti-trust law.

These decisions left the railways with but little ground for lawful coöperative action. Thus hedged about with laws, whose framers apparently failed to discern that in the railway business coöperation is essential, the railroads since 1898 have been forced to resort to secret agreements to regulate their inter-relations. Through the traffic associations informal agreements are made as to rates and classifications. These are lived up to so effectually that the Interstate Commerce Commission in its annual report for 1901 declared that "the decision of the United States Supreme Court in the Trans-Missouri case and the Joint Traffic Association case has produced no practical effect upon the railway operations of the country. Such associations in fact exist now as they did before the decisions, and with the same general effect."

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[1] Meyer, Railway Legislation in the United States.

To effect uniformity in the classifications of freight so-called classification committees, representing the interests of the various railroads throughout the country, have sprung up. Since the enactment of the Interstate Commerce Act three great classifications have obtained, viz., the Southern, the largest, with seat at Atlanta; the Official, with offices in New York; and the Western, centering in Chicago. The latter exercises jurisdiction in the territory west of Chicago and the Mississippi; Official territory lies east of the Mississippi and Chicago, and north of the Potomac and Ohio rivers; the Southern classification obtains in the territory south of the Ohio and east of the Mississippi. Each of these groups is in charge of a Classification Committee, which is entrusted by the railways of the different sections with the work of classifying the freight into first, second, or sixth class, etc. At present there are about 9,000 articles included in these classifications. Many commodities, however, are still carried at special or commodity rates, and though efforts have been made to bring them all under one general freight classification such a consummation seems impracticable at the present time.

(To be continued.)

PRINCIPAL ERRORS COMMITTED IN THE TEACHING OF ELEMENTARY GEOGRAPHY AND THE NATURAL SCIENCES

1. *Verbosity.* Basing the instruction on oral descriptions rather than in the direct observation of nature.
2. *Inflexibility.* Disregarding the free expansion of the mental activity of the child, the instructor aiming to make the pupils think and speak as he himself does. This weakens the confidence of the children in their own powers and is injurious to the formation of character.
3. *Vagueness.* Asking questions the replies to which may be found by chance. This necessitates the making of ridiculous statements or blunders, vitiates the reasoning power and tends to the loss of time—presenting lessons without plan.
4. *Impatience.* Preventing the children, especially the backward and slow, from reflecting calmly.
5. *Childishness.* Presenting unnecessary and foolish examples and comparisons, prejudicial to the exactitude of ideas (fidelity).

Observation: All the errors noted above are committed in teaching the various subjects of the curriculum, but they are more frequent and attended with greater danger in treating the natural sciences.—*Anales de Instruccion Primaria, Montevideo, Uraguay.*

EDITORIALS

CURRENT EVENTS

BEGINNING with the March number the JOURNAL will regularly contain a department devoted to Current Events in Geography. This department will be under the direction of Superintendent W. W. Rupert of Pottstown, Pa., who for several years published with great success a series of geographical leaflets devoted to current events in geography. The aim of the department will be to present those more recent changes in the geography of the world that will be of help to teachers in making their class-room work interesting and practical.

THE ASSOCIATION OF AMERICAN GEOGRAPHERS

The announcement in our column of News Items of the recent formation of the Association of American Geographers is of more than passing interest to workers in educational geography. Though the new association is small and is entirely composed of the men and women known for their work in scientific geography, the association will not devote itself entirely to the advancement of research in geography.

The names of the president and secretary-treasurer—both with a wide and enviable reputation for their contributions to educational geography—are a guarantee that the promotion of this important phase of applied geography will not be neglected.

The association will take up many problems in the near future and will actively begin work to make scientific geography more accessible to teachers and to help teachers of all grades to become better geography teachers.

The plans that have been proposed to bring about this much to be desired end, are as yet tentative only, but will be announced as soon as sufficient progress has been made to warrant publicity.

THE NEED OF LOCAL GEOGRAPHIC SOCIETIES

The formation of a national scientific society of geographers, like the Association of American Geographers, cannot be of the greatest effect unless accompanied by increased interest in geography in local centers. The local geographical societies of the country, composed of scientists and laymen, are already numerous. Each local society acts as a center of geographic interest and work; helps efficiently in the development of public opinion in reference to geography and in spreading geographic knowledge. The more local societies the better for the cause of geography in the country, whether these societies be composed of geographers, of people interested in geography in a general way or of teachers. Clubs of teachers may be most effective local geographic societies as has already been proved in several places in this country.

The formation of the new Geographical Society of Minnesota is a step in the right direction and we trust other similar societies may be organized in the near future in the several large cities of the country in which the workers in geography are not as yet banded for mutual assistance.

PHYSICAL GEOGRAPHY FOR HIGH SCHOOLS

Several years ago the College Entrance Examination Board prepared and published an outline for a course in physical geography for fourth year high school pupils, which might be used as a basis for the examinations given by the board and which would be accepted for college entrance by several of the eastern colleges making use of the board's examinations. Though this course was primarily for college entrance, it was intended to be a course of value also for secondary school pupils who did not intend to go to college. As a result of this action, many of the secondary schools, especially in New York state, placed their physical geography in the fourth year and included in it a goodly proportion of laboratory work.

In 1901 a committee of the New York State Science Teachers' Association, published in the Proceedings of the Association an inclusive report outlining a course in physical geography for fourth year high school pupils and showing how the same course, in an abridged form, could be applied in the earlier years of the course.

This year a committee of the Academic Principals of New York has reported to the Regents of the University of the State of New York, a course of study based on the report mentioned above, and has recommended that physical geography be included in the last year of the high schools in New York State. If this report is adopted it will mean that the approved course of study in physical geography for the secondary schools of New York state will prepare for college entrance and will strongly emphasize laboratory work.

At its meeting during the last week in December, the New York State Science Teachers' Association formally recommended to the Regents that physical geography be made a fourth year high school subject.

If these several recommendations are adopted by the Regents, geography teaching in the secondary schools of New York state will have made a great advance—far greater than has been made in all the last twelve years since the first exploitation of modern physical geography in the epoch opening report of the Committee of Ten.

REVIEW

STUDENTS' LABORATORY MANUAL OF PHYSICAL GEOGRAPHY[1]

THE laboratory exercises in Brigham's manual cover the field presented in Gilbert and Brigham's "Introduction to Physical Geography" and furnish a helpful supplement to the volume.

While laboratory manuals of physical geography are becoming almost numerous, few, if any, are as comprehensive in scope as the volume under discussion. Each department of the subject receives due consideration though if this attention were more impartially bestowed the result might be better. Eighty-four pages are devoted to problems on the lands, thirty-six pages to those of the atmosphere, fourteen to the earth as a globe, seven to the ocean and four to life distribution.

There seems to be an over emphasis of the lands, and too little attention to the earth as a globe and to the ocean where, in each case, many topics valuable from the laboratory standpoint have been omitted. The work on the lands is detailed in the extreme and being based on type forms drawn principally from our own country should certainly result in an understanding not only of the physical geography of the land but in a renewal of knowledge of the United States as well, gained and perhaps forgotten in earlier years.

The questions proposed are generally strong. Most of them stand the test of good questioning, arousing thought and inciting to investigation. A few are disappointing, suggesting too much and thus defeating the purpose of laboratory work. The following, selected from a field exercise on weathering serve as illustrations of the latter point: "Has it (marble) lost its polish in whole or in part? Do any seams appear? Have the corners scaled anywhere? Is the top surface roughened and pitted by the solvent work of rain water?" etc.

The emphasis upon library work is somewhat disproportionate for a laboratory course, though it is probably true that many schools are more ready to do good work in the library than in the laboratory. There is danger in permitting pupils to go to the text-book or to the encyclopedia for information and accepting the results as "laboratory work." This work is certainly valuable but it is not independent investigation and while it should have a place in a course in physiography it should not be possible to substitute it for laboratory work if laboratory work can in any way be introduced.

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[1] Students' Laboratory Manual of Physical Geography. By Albert P. Brigham. Pp. 153. New York: D. Appleton & Co., 1905.

There are occasional maps and illustrations in the manual upon which exercises are based though the attempt has not been made to embody in the volume all the materials of this nature required for the work. An excellent list of topographic maps—all of those mentioned in the text—is included in the appendix.

While laboratory workers in physical geography will scarcely adopt the manual in its entirety there are a sufficient number of exercises, approximately one hundred and thirty, to allow a sifting of problems and a selection of those best adapted to the development of the pupil and to that of the subject under discussion. The book is as a whole very suggestive and is probably the best in the field though it lacks strong quantitative exercises in several departments. C. B. K.

RECENT PUBLICATIONS

EXCURSIONS AND LESSONS IN HOME GEOGRAPHY. By C. A. McMurry, pp. ix + 152. New York, The Macmillan Company, 1904.

A series of suggestions as to excursions for beginning pupils, showing how excursions have been conducted in different places to study local scenery, shops and factories, commerce, agriculture and government. Extremely detailed and full of information for a teacher. Many of the topics included are not strictly geographical and in several cases the minutiae are over-emphasized. Well illustrated and helpful, especially to those who believe in teaching technical details in industrial geography.

TYPE STUDIES FROM UNITED STATES GEOGRAPHY. By C. A. McMurry, pp. vi + 288. New York, The Macmillan Company, 1904.

An amplication of the author's well known series of suggestions as to teaching the United States by types—that is, by emphasizing one locality as a basis for comparing other similar localities with it. Well illustrated and good for supplementary reading, but alas! is minus an index.

PHYSIOGRAPHY—AN INTRODUCTION TO THE STUDY OF NATURE. By T. H. Huxley. Revised and partly rewritten by R. A. Gregory, pp. xi + 423. New York, The Macmillan Company, 1904.

A modernized edition of Huxley's classic Physiography, in which the clear exposition and attractive style of the author are retained. Well illustrated and extremely interesting. Should be read by every teacher of physical geography.

HOW WE ARE CLOTHED—A GEOGRAPHICAL READER. By James F. Chamberlain, pp. viii + 235. New York, The Macmillan Company, 1904.

A companion volume to the author's How We Are Fed, and extremely helpful for supplementary work in the earlier grades. Brief accounts of the characteristic dress of different peoples, followed by accounts of how different textiles and goods are produced. Style somewhat choppy and descriptions often interrupted by thought disturbing questions. Hence the book does not always read smoothly for the child. Illustrations pertinent and effective.

NEWS ITEMS

Association of American Geographers.—On December 29, 1904, an Association of American Geographers was formed in Philadelphia, membership in which is limited to persons who have done original work in some branch of geography. According to the constitution the "object shall be the cultivation of the scientific study of geography in all its branches, especially by promoting acquaintance, intercourse and discussion among its members, by encouraging and aiding geographical exploration and research, by assisting the publication of geographical essays, by developing better conditions for the study of geography in schools, colleges, and universities, and by coöperating with other societies in the development of an intelligent interest in geography among the people of North America."

The officers for 1905 are:

President—Professor W. M. Davis, Harvard University.

Vice-Presidents—Mr. G. K. Gilbert, U. S. Geological Survey; Mr. Angelo Heilprin, Philadelphia Academy of Sciences.

Secretary-Treasurer—Professor A. P. Brigham, Colgate University, Hamilton, N. Y.

Councillors—Professor R. S. Tarr, Cornell University, Ithaca, N. Y.; Mr. H. C. Cowles, University of Chicago; Mr. Cyrus C. Adams, American Geographical Society, New York City.

The Geographical Society of Minnesota.—A new geographical society has recently been formed in Minnesota and held its first meeting at Minneapolis on December 27. The president is Professor C. W. Hall of the University of Minnesota. The secretary-treasurer is Mr. Charles E. Flitner of the U. S. Grant School, St. Paul.

Geographical Activity Among the Teachers of Trenton, N. J.—Superintendent Mackie of Trenton, N. J., recently sent out a circular letter to the teachers of the city asking their opinions as to the desirability of forming a class for the study of geography during the present winter. The teachers met and voted to form such a class and asked Supervisor R. H. Whitbeck of the State Model School to take charge of the class. The outline of work for the winter includes fifteen lectures, supplemented by assigned readings and the preparation of two papers by each of the teachers. Field trips will be taken in the spring. Over one hundred teachers are enrolled in the class and the studies are being carried on with genuine enthusiasm.

NOTES

GEOGRAPHY AT COUNCIL BLUFFS, IOWA[1].—Iowa has fewer acres of untillable land than any other State in the Union, and, in consequence, its population is scattered on farms and in small cities. Its educational policy is too nearly indicated by the headlines in a recent Iowa newspaper: "Fads not popular. County superintendent to stick to old lines."

But at Council Bluffs, Mr. W. K. Clifford, first as the principal of the high school, then as superintendent of the city schools, has been proving for six years that the old lines may not be best, that the old highway of the three r's can be improved. The result is, that Council Bluffs children read better, write better, and know more about arithmetic than the children elsewhere trained under older methods.

"I used to think," said Mr. Clifford, "that, if I ever came to have charge of schools, I would not teach some things as I had been taught." Thus, for one thing, he introduced the novelty of teaching the children to read, to write and to cipher in teaching them geography.

At the beginning of his work, he found the children still sing-songing lists, "Alabama produces—" "Louisiana produces—" He sent out at one time in many directions, more than a hundred letters asking, "Can you give me, lend me, or sell me material illustrating your part of the country?" The people who got the letter replied. Much has grown from that beginning. No teacher in geography in Council Bluffs is now "asking questions from books." They do not have the traditional book.

In a grammar school class there that I visited, the subject of the lesson was China. The children had read something about Chinese history and Chinese customs in a geographical reader, the text and pictures of which had aroused their interest. Now they were studying about silk manufacture, learning about a product in Superintendent Clifford's new way. On the teacher's desk was an array of bottles and cases, with samples of silk mounted on cardboard. All about the class room, ranged along the board or in the children's hands, were pictures representing the silk industry.

While the rest of the class told or wrote the history of the silk from moth and egg to taffeta or brocade, a little girl showed me parts of the exhibit. "See," she said, with modest enthusiasm, "how neatly the worm eats out the place in the leaf."

Among the things she showed me were pictures of Corticelli silkworms, a worm eating, a worm full grown, and a worm ready to form the cocoon; a set of illustrations of silk manufacture showing the cocoon from the first spidery floss on the tree to the final stage with the worm out of sight; and illustrations of silk manufacture. There were samples in bottles of the wild silk from the wild silk worm, of raw silk, of silk in its various manufactured stages. About each of these things, the children could talk and write.

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[1] Reprinted by permission from the World's Work, July, 1904.

In a box by itself was the printed matter, furnished to the teacher for the lesson. It included a list of references to the best text-books, material culled from some of them, a mass of printed matter prepared by the Philadelphia Commercial Museum, an article on silk, two pamphlets issued by a silk company, a chapter from "Stories of Industry," and a topical outline of the whole subject for use in the class room. "In this sort of thing," said Mr. Clifford, "a supervisor could work his teachers too hard. I do not expect them to go to the library and work themselves to death at night."

The superintendent himself provides the material for lessons like this. It is gathered from many sources. From the printed illustrations and from photographs, the science instructor in the high school, Mr. Thomas, prepares the lantern slides. Much of the material like the silk cabinet, showing the stages of the manufacture, is bought as it is used; some of it is made up to order; and much is given. Cocoa manufacturers have sent generous exhibits. One not only put up a complete set of pictures and bottles, but expresses the whole, free, to any school that wants it. A coffee house has furnished a similar complete coffee exhibit. Photographs of cocoa trees, and coffee plantations, sent in this manner, show to the children the actual employees who have gathered the cocoa and the coffee that are in the bottles. Nothing from any source likely to stimulate the child's interest is overlooked.

The materials are first packed in the superintendent's office, into light cloth-bound boxes. They then circulate from one school building to another. While one division of the grade studies silk, another, also working on China, is busy with tea. When each has finished, exhibits are exchanged. Each teacher, too, with the assistance of her class, voluntarily collects additions to the material furnished; and these remain a stationary "exhibit" in her own class room.

The stereopticon is also used in elementary grades to reinforce not only geography but every subject. Nearly every school in the city has a lantern —bought with money raised at school entertainments. At these entertainments the children's work is shown to the parents. "When we began," a principal said to me, "People that lived under the shadow of the school and never saw what was going on, came and saw. We charged everybody, adults and children alike, ten cents. When the first exhibition was over we had a hundred dollars. With fifty dollars we bought a lantern, and fifty dollars remained in the treasury."

The crowning lesson on an industry is the lantern lecture. At one which I attended, the occasional "Oh! Oh!" or "Ah-h!" that greeted a picture was very expressive. The children of one class described in turn, the things going on in the pictures of lumber camps, of sugar factories, of cotton gins; and forty listening class mates were ready to correct mistakes or to supply omissions. All the classes write accounts of the pictures, describing one or many. Here enters Mr. Clifford's combination of many studies in one. The work may be called geography, penmanship or composition.

I had a stenographer record one review lesson. Here are scraps of oral work from sixth grade childrens' story of wheat. The scraps are uncorrected from different parts of the recitation:

Girl—The origin of wheat is not known, but most botanists think it is in the western Asia near the Mediterranean Sea. The Chinese are known to have cultivated wheat two thousand seven hundred years before Christ, and the Egyptians before them. A grain of wheat was found in one of the pyramids of Egypt. In Egypt the goddess is called Isis and in Greece this goddess is called Ceres. In Egypt when the Nile River overflows, the wheat is scattered over the water and sinks into the earth. The wheat spreads and before the Nile River overflows again the next year the wheat is ready to harvest.

Teacher—Anything she forgot?

Girl—From the goddess of Greece called Ceres, we get the word cereal, which means grain.

Boy—The winter wheat has a much stronger stalk than the spring, and the kernel is larger.

Girl—The wheat stalk is from three to five inches long.

Boy—The winter wheat has a much larger stalk, but it is brittle and the spring wheat has a stronger stalk but it is tough and does not break so easily.

Boy—Every large mill has a man to bake the flour into little cakes to see if the flour is all right in baking.

Girl—There is a chemist, too.

Boy—He tests the flour to see how much gluten there is in it, and see how much it is worth.

Before every child in Council Bluffs finishes the eight elementary grades he has studied in his geography course, by means of "exhibits" and lantern lectures, thirty productions or sets of productions: Cotton, flax, Manila hemp, Sisal hemp, ramie, wool, silk, wheat, corn, rice, cocoanut, coffee, tea, cocoa, sugar (cane, beet and maple), honey, woods, cork, packing-house products, buttons, rubber, petroleum, copper, sponges, zinc, coal, asbestos, Alaskan products, Philippine products and Hawaiian products. Every month this list grows. And the children's power of expression, both oral and written, grows visibly as they advance from grade to grade, learning from objects and from pictures.

From the time when the pupils in the first grade tell the story of Cinderella from pictures on the screen, till upper classes are ready for college, the lantern is in constant use. Alps, or Indians, Mexico or the Pied Piper, every subject has its turn. The same set of slides clears up the allusions in a poem, furnishes composition themes, and reinforces history. Colored lantern pictures of the Yellowstone, of the Kremlin, of a street in Constantinople, tell and suggest far more than the prints of the geography text. By the lantern work the dull are stimulated.

The Council Bluffs child who has seen mats woven from a certain straw in India, the rope twisted from it in China, the thatch furnished by it for a house in the Philippines, is finding out the world he lives in. He may also establish actual relations with distant parts of it. For example, former Council Bluffs teachers now in the Philippines write to the pupils and send them little museums of native objects—banana fibre and the soft cloth woven from it, pottery models of native stoves, betel nuts, soap-bark used for washing the hair, a doll dressed to represent a native lady, silky cotton from the cotton tree to be compared with the coarser product of our shrub. "All these things have an extraordinary fascination for the children," said one of the teachers. "They like to read about them, talk about them, write about them, spell their names and draw them." I have even found that these children were exchanging letters with public school children in Seattle, in Los Angeles, and in Jacksonville, Florida, about subjects in which they had become interested.

All this gives a zest to the school work. There is interest in a letter that is going somewhere, a charm in the arithmetic of a tea invoice if you "know all about tea," a certain thrill in words like palm and bayou, ice-floe and jungle, if you know what they stand for. Vitality in one school subject vitalizes all the subjects.

"This is all very well," says the carper, "but do these children know capitals and rivers? Can they bound Arizona?" They do. They can.

They learn these things in many ways. Every school room from the kindergarten up, is equipped with a sand table. When a section of the earth is to be studied, groups of children build up a relief map of that section, comparing it carefully with a model on the wall. In an individual sand pan at his desk each child constructs another map. One little class, advanced beyond the study of their school-yard, their city, and Pottawattamie county—for these parts of the earth are always studied first—had reached the point where all Iowa was their province. A dozen of them were gathered around the big sand table. When I entered the room, the sand map of Iowa was complete in outline and was provided with the indentations for rivers.

"Put in the cities, Thelma," said the teacher.

Thelma gathered up from the boards behind her a handful of chalk bits, and set them briskly in place, interrupted by others the instant a white spot lost its bearings. "Clinton is farther south." "Isn't Burlington a little more west?" "You've forgotten Sioux City."

Two of the boys with tiny twigs "planted trees" along the rivers.

"Farther apart because there are no forests," admonished the teacher.

Many hands dived into a box and set coal, lead, stone, wherever there were mines or quarries. Several stretched different colored strings from one chalk city to another to represent the railroads they named as they settled the twine. Corn and oats were picked out and strewn broadcast, to show the districts where corn and oats are grown, and paper pigs and animal crackers were dispersed to indicate the portions of the state where hogs and other domestic animals are raised.

Salt-and-flour maps that, completed, look like plaster casts, are modeled for every section of the earth studied. Elevations, depressions, outline, are painstakingly molded. After the maps are dried, rivers are drawn in black ink. The supporting pasteboard is tinted to suggest the water of the oceans most of these children have never seen. For every geographical section too, every child makes a "book" of free hand paper maps. A common set holds seven—the political divisions (colored); rivers and capitals in black and white; elevations variously indicated; animals sketched in ink—a hog rampant forefeet in a trough, sheep very meek, cows of towering and pointed horns; vegetable productions, represented by pears, cranberries, a sheaf of wheat, apples on a twig, maple sugar trees tapped for sugar; characteristic industries, indicated by a shoe, a watch, a factory with an amazing wealth of chimney, cars carrying coal, or lumber floating in a river; railroads, generally done in colored lines.

Sometimes the map shows the wild animals only, and looks like those our learned ancestors of the eighteenth century adorned with "lyons and other beasts of prey." One picture I saw—a large cod swimming into Cape Cod Bay—suggested the whales in early prints in Boston. Sometimes the vegetable map is decorated with fruit and flowers done in color. The ingenuity to be found in any dozen of the little map "books" is startling. The result of this method of training is that these children can "bound" anything, because they know, not because they remember.

HOW THE TEACHERS STUDY.—To give the children a definite idea of certain industries, teachers take them to visit neighboring shops and factories. To give the teachers a closer knowledge of what they teach, Superintendent Clifford makes journeys to outside places. The initial trip, Christmas, 1902, was to New Orleans. Fifteen teachers with Mr. Clifford and his family chartered a tourist car. The cost of travel for each person was little more than the ordinary fare for a berth. The car had a stove in it. The party prepared food, and milk and cream which they kept cool by putting them on the platform. Roast potatoes, breakfast foods, hot soups, waffles and syrup were part of the menu. A stop at St. Louis gave them a glimpse of that city. At New Orleans, they found luxurious quarters in an old mansion for seven, eight and ten dollars a week, took two meals a day at an excellent restaurant for fifty cents a meal, had a late salad supper at their rooms. They visited the sugar and cotton plantations, the oyster bay and cannery at Biloxi, Mississippi, the sugar factories and the shipping docks. The women went to the French opera; the men were entertained by the clubs, and met there prominent Southerners, whose ac-

quaintance was a delight. The trip took two weeks, cost very little and added immeasureably to the usefulness of every one who went. Mr. Thomas took seventy-five pictures, and, on his return, converted them into lantern slides. The teachers who went on the trip always show these pictures to the children that are studying the Southern States.

I heard one of these teachers give a New Orleans talk to the class. It did not contain a wasted word. Every picture had a distinct value. The levees of the Mississippi, the stately plantation homes, the bayous, cotton-fields, negro cabins, negro school-rooms, the French city, the rice fields—all these things were full of interest, because the teacher had studied her subject at first hand, and was able to mingle illuminating anecdotes with facts.

But facts are not all the children gain from such talks. They learn also to sympathize with conditions that are strange to them. The teacher's story of the generosity and hospitality of the New Orleans school superintendents, "real southern hospitality," awoke a lively interest; her description of the statue of Robert E. Lee, "a brave man, loved by all broad-minded people," evoked a spirit worth even more than "information."

Indeed, the results of the trip to New Orleans have been such that Mr. Clifford plans to secure trips to Mexico and to Cuba. Nothing is wanted but money. Many teachers cannot afford to educate themselves in this manner. If the city will, either by direct appropriation or by raising salaries, make possible many such expeditions, not ten per cent., but ninety per cent. of the teaching corps will be able to pass on to Council Bluffs children what they themselves have gained from travel.

WIND BAROMETER INDICATIONS.—When the wind sets in from points between south and southeast and the barometer falls steadily a storm is approaching from the west or northwest, and its center will pass near or north of the observer within twelve to twenty-four hours with wind shifting to northwest by way of southwest and west. When the wind sets in from points between east and northeast and the barometer falls steadily a storm is approaching from the south or southwest, and its center will pass near or to the south or east of the observer within twelve to twenty-four hours with wind shifting to northwest by way of north. The rapidity of the storm's approach and its intensity will be indicated by the rate and the amount of the fall in the barometer.—*Daily Weather Map.*

SCHOOL GEOGRAPHY BY CORRESPONDENCE.—Miss Anna J. Stone, Principal of the Jarvis Street School, Binghamton, N. Y., would like to exchange letters by grades with some school at a distance, and can arrange for such an exchange in all of the eight grades.

OUTLINE OF COURSE IN GEOGRAPHY FOR STATE OF MICHIGAN.—General Considerations. I. The aim in all geography teaching should be to elicit ideas, not to teach words; to secure the understanding of geographical facts and the building of mental images of distant places, peoples and conditions, not to have statements about them memorized. The ideal in this teaching is to seek the facts of geography in the world of out of doors when we can get at them there, in photographs and maps that symbolize this world, and in the text-book, which is perhaps the least vivid of these sources.

II. Class work in geography should appeal to both reason and memory; reason first and memory last. Children should be led to build images from out of doors observations, from the study of maps and photographs, from these to reason out and image distant geographical facts, and lastly to memorize them. When the stage of memorization is reached, there should be no half-hearted work; facts should be driven home to stay.

III. The committee recommends a first study of the main physical features of each continent with a brief treatment of prominent physical regions, closing perhaps with the middle of the fifth grade, and then a thorough intensive study of the few important countries of the world up to the end of the seventh grade. To supply a basis for comparison in the study of foreign countries and in view of the fact that many children leave school early, it is recommended that the United States be studied twice, first at the end of the regional study and again in more detail at the end of the course.

IV. The following is the order of study recommended:

1. Home geography, below the fourth grade and preceding the use of any text-book.

2. The earth as a whole. Important material is the cheap globe, one to every few pupils.

3. Prominent physical features of each continent, with brief study of regional geography.

Note. So much (1, 2 and 3) may perhaps be accomplished by the middle of the fifth grade.

4. The few important countries studied intensively, a few others briefly, touched from the standpoint of their main interest for the rest of the world, which may well be at times the course of current events.

V. The thorough study of a country regarded as important should bring the children vivid ideas of what that country is and stands for in the world's progress, ethically, socially, industrially and commercially; what are her landscapes, her people, her cities and villages; how she lives, what her institutions, and the influence they have had on the world's work, and especially their influence upon and relation to the progress of our own country. If the location of fewer cities, mountains and rivers should be taught than has been usual, they should be taught very thoroughly.

A few countries—and these the countries of most importance—made real in landscape and institutions—this is the committee's ideal of geographic attainments in the grades.

The following schedule suggests how such a plan of study could be fitted into the allotted time. The committee thinks of such time for such countries rather than just this time for just these countries:

Grade III. Observational or home geography, throughout the year.

Grade IV. The world as a whole, 6 weeks; regional study of North America, 10 weeks; regional study of Europe, 10 weeks; regional study of Asia, 6 weeks; regional study of South America, 4 weeks.

Grade V. Fuller study of United States and Michigan, 10 weeks; regional study of Africa, 4 weeks; regional study of Australia, 4 weeks; intensive study of Great Britain, 10 weeks; intensive study of Germany, 8 weeks.

Grade VI. Intensive study of France, 8 weeks; intensive study of Russia, 6 weeks; intensive study of Japan, 6 weeks; intensive study of China, 4 weeks; intensive study of India, 4 weeks; intensive study of Brazil, 3 weeks; intensive study of Chile, 3 weeks; additional, 2 weeks.

Grave VII. Intensive study of Argentine Republic, 3 weeks; intensive study of other countries, 15 weeks; intensive study of United States, 18 weeks.—From 14-page Report on Course of Study in Geography, published in *Normal College News*, November, 1904.

MAP STUDYING.—It is as futile to attempt to study geography without maps as it would be to attempt to study chemistry without handling any of the substances treated of in that science. The study of maps is an absolutely essential factor in the study of Geography; for a map is the ultimate record of all geographical work. The difficulty of the geography teacher lies in leading his pupils to use the maps properly; in other words to make the map the means of developing the thought power. To attain this end, it is essential that the pupils in the lower classes should have been taught to take a bird's eye view of the town or the village in which they live and draw a sketch map representing its main surface features. They must be told to associate with it some definite measure, such measurement as shall constitute a scale. It is only when they have received such training, that they will be able to realize that the lines upon a map represent the physical features of the earth as actually observed and drawn to scale. A map in general use in our schools at the very first sight presents an immense variety of information to enable the student to see for himself the size, the outline of a country, the relief of its surface, the character of the coast, the courses and navigability of rivers, the size and position of towns, the administrative divisions, the roads, canals and railways. But all this is too much for a pupil even of the high school. The effect of such a map on the young student is repellent. To make the teaching more effective and less confusing it is better to have different maps to deal with different points. Considerations of cost will stand in the way of 99 per cent. of our schools in the matter of the purchase of these maps. But I believe no school can get on without a copy of a good atlas of the sort of the Twentieth Century Atlas. With the help of the maps in this atlas, the teacher ought to draw outline maps on the blackboard and insert in this map only such information as the prescribed lesson of the hour necessitates. This will enable the students to study the individual points with great clearness. The teachers will be at liberty to make these maps as simple in character as he wants them to be. He can tell them the meaning of the symbols he employs: for map-reading as after all only the interpretation of symbols.—*Indian Journal of Education,* September, 1904.

CURRENT ARTICLES ON COMMERCE AND INDUSTRY.—

December:—

British India, The Future of, *World's Work.*

China, *Nat'l. Geog. Mag.*

Chinese Business Methods in San Francisco, *Bookkeeper.*

Clothing Manufacture: The Rise of the Tailors (Ill.), *McClure's Mag.*

Coffee: Notes Upon Its Introduction and Cultivation in Costa Rica, *Bull. of Bureau of Am. Republics,* Nov.

Education: Successful Careers of College Graduates, *Sat. Evening Post,* December 3.

Education: The Value of Employees, *System.*

Handicrafts, Revival of, in America, *Bull. of Bureau of Labor,* November.

Leather Market, Greatest of the World, *Shoe Retailer,* December 14.

Leather Manufacture Developments in the Past Year, *Hide and Leather,* December 31.

Merchant Marine Commission, *Rev. of Revs.*

Mississippi River: Restoring a National Waterway (Ill.), *World To-Day.*

New England, Industrial Crisis in, *World To-day.*

Philippine Life, An Inside View of (Ill.), *World's Work.*

Precious Stones Industry, and the Share of the United States Therein, *Consular Report,* November.

Quinine, World's Production of, *Bull. of Bureau of Am. Republics,* November.

Railway System in the Making (Ill.), *System.*

Recreation: How a Great City Amuses Itself (Ill.), *World To-day.*

Rice Crop of the U. S., *Crop Reporter.*

Russia, Shoe Retailing in, *The Shoe Retailer,* December 14.

Shoe Manufacture: The Making of a Goodyear Welt Shoe, *Hide and Leather,* December 3.

Soap, the Chemistry of, *Paint, Oil and Drug Review,* December 7.

Sugar Product of Hawaii (Ill.), *Rev. of Revs.*

Transportation: Electric versus Steam Locomotive (Ill.), *Rev. of Revs.*

Welfare Work: Making Lieutenants of Industry (Ill.), *World To-Day.*

E. D. J.

REFERENCE BOOKS FOR COLLATERAL READING IN THE GRADES.—Mr. Charles D. Andrews, Inspector of Normal Schools for the New York Department of Public Instruction, published in the *School Journal* for December 10, 1904, a selected and annotated list of supplementary readers in geography adapted to all grades of elementary school work.

GEOGRAPHY AT THE COLLEGES AND UNIVERSITIES OF THE UNITED KINGDOM. — According to the last number of the *Geographical Teacher* (London) geography is now recognized in more than a casual way in at least thirteen of the colleges of the United Kingdom, though there are eight colleges in which the subject still has no place. The work given at the different institutions includes all phases, but embraces more regional geography and history of geography than is usually the case in American courses. Political geography also receives much attention, but there is only one course in anthropogeography, a field that is too much neglected in all college and university work.—*Bull. Am. Geog. Soc., Jan., 1905.*

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THE RATIONAL ELEMENT AS AN ORGANIZING PRINCIPLE IN GEOGRAPHY

BY W. J. SUTHERLAND

State Normal School, Macomb, Ill.

IT is the conviction of the writer that there is no failure in teaching more serious than the failure to generalize. The character of certain subjects, and the method of instruction, make them especially subject to such omission. Geography is exceedingly liable to suffer from the teacher's neglect to organize and generalize. The climax of all good teaching is reached in these processes, and any instruction that stops short of them fails accordingly.

In a deductive study, like geometry, every conclusion is a general truth, not only applicable to but necessary in any further development of the subject. Each conclusion is a premise in a succeeding theorem; the subject tends to unify itself. Inductive studies place more responsibility upon the teacher. Because the content of geography is so broad and varied, and because its nature, phases, and values have been so poorly understood, it has doubtless suffered more from a lack of organization than any of the common school subjects.

The old geography devoted itself almost wholly to *fact* study. Vast numbers of items were learned "empirically," as ends in themselves. There was so little sequence, aim, and reason in the subject that it fell far short of a science. It was composed of cross-sections of geology, astronomy, zoology, botany, etc., but the subject-matter was not articulated for a purpose. The old question of "what and where are the following" is suggestive. Isolated and unrelated facts, interesting in themselves but often valueless, because they did not bear upon any generalization, engaged the attention of the student.

The view of geography to-day is—thanks to the scholars in our leading universities—rapidly changing. Without attempting to summarize the new view of geography the writer, for the sake of discussion, ventures the following definition:

Geography is the science that treats of—

1. The earth's crust in its present condition.
2. The forces which fashioned this crust.
3. The adjustment and adaptation of life to the crust.

This view of the subject suggests a strong rational element. The study of any region necessitates the consideration of *three* sets of factors or processes. These may be designated as inorganic, dynamic, and organic. The inorganic phase considers the earth's envelopes in static conditions—as the crust, its topography, rocks, soils, minerals; the atmospheric and aqueous envelopes as related to rock-weathering and oxidation, and to plant and animal life. The dynamic deals with the interaction of these envelopes as influenced by heat, gravity and planetary motion. This phase includes the subjects usually treated in dynamic geology. The organic deals with life as fostered by particular combinations of local influences.

It may be said by some that these limits are too broad, but any adequate study of a man's environment leads to all of these investigations. If mere *fact* is the goal of geographical study, then the "why," the rational side of geography may be lopped off and we shall then return to the old basis of teaching the subject. If, however, an *understanding* of the earth as a *habitat* is the object of geographical study, then certainly much value must be placed upon reason and relationship.

Without taking cognizance of the "causal nexus" it would be quite impossible to organize the subject-matter of geography. Careful selection and arrangement of data must precede induction, inference, conclusion. The rational element is the thread upon which the facts are strung. The empirical facts of the old geography were lost as readily as beads from a broken string, but perhaps the loss was not great, because facts learned after such manner are insignificant. Significance comes when order is established, when, as Dr. Harris says, one fact is made to explain another to which it is related. An arrangement of facts to show logical sequence is organization. It assists the memory, clarifies and intensifies the meaning, and leads toward a classification of geographic material.

Men succeed best in industrial life when they best adjust themselves to their environment. To some degree man may modify an unfavorable condition; that being done, the best adjustment is effected when human effort is applied most harmoniously to the remaining natural conditions. Failure to succeed follows a failure to interpret natural conditions aright. The poor success of the early Puritans is an apt illustration of a poor adjustment to physiographic conditions. The influence of geography on political and industrial history is now generally conceded. It is to this theme that Prof. Brigham and Miss Semple have so successfully lent themselves, and scores of examples could be given to show how natural resources and environment have eventually determined man's residence and occupation. The study of adjustment is one of the most interesting and fruitful phases of geography and emphasizes strongly the rational element. It is held by some that in seeking causes there is danger in going beyond the limits of geography proper, and of entering the domain of pure science. If a bit of science is here or there necessary to explain a condition, then let it strike sharply against the geographical fact of which it becomes a legitimate part, standing in the relation of cause to effect.

Prof. Dryer recognizes the rational side of geography in the following definition of the subject: "The business of geography is first to determine accurately the distribution of each and all the factors of geography (land, water, air, plants, men) and, second, to discover the causes which have brought about the distribution of each; and, third, to explain the relation of each factor or group of factors to all the rest."

Hence cause, relationship and consequence seem to merit special emphasis. Says Prof. Davis: "Another step of equal importance . . . . is the change from the empirical to the explanatory or rational or genetic method of treating the elemental facts that enter into geographical relationships." And again: "The mere existence and location of cities stated independent of their controlling environment fail to become truly geographic as long as they are stated without reference to their cause." Empirical facts in themselves are stern things and offer little freedom to mental action; but facts of relationship challenge the mind to solve a problem, to theorize, to speculate and eventually to induce from what seems to be a heterogeneous mass of facts, a universal law. As soon as this is done, the individual facts arrange themselves in as orderly array about the *law* as do bits of iron about a magnet. May we not call this arrangement and subjection of facts under a general law, organization?

Diastrophism and gradation have been the prominent physiographic processes in Illinois. Let us notice their control over distribution of population, and industrial history. By nature's accidents much of Jo Daviess County, the extreme northwest of Illinois, escaped the grinding and planing of glaciers; but eroding and denuding agencies have removed the later deposits and left exposed the Niagara limestone, Cincinnati shales and the

Galena limestone. Galena—lead sulphide—is found in crevices and pockets of this deposit. The city of Galena owes its growth almost entirely to the mineral from which it was named, and its recent decline is the direct result of the exhaustion of the mines. The rough and deeply dissected surface has made a re-adjustment to agricultural pursuits impossible.

The anticlinal fracture which crosses Illinois in a southeast direction from Stephenson County to Livingston, intersects Rock River a few miles south of the city of Oregon, in Ogle County. For several miles along the river this disturbance has brought to the surface St. Peter's sandstone. The beautiful white and buff cliffs fringing the crystal waters have made the region one of rare picturesqueness, an ideal location for the summer homes now building in the vicinity. This sandstone affords unlimited material for the manufacture of glass. The fracture repeats the beautiful scenery where it crosses the Illinois River a few miles east of the city of La Salle. Starved Rock and Deer Park, as well as Castle Rock and Ganymede, have national fame. But it is the effect of this fracture upon

Castle Rock, bank of Rock River, near Oregon, Ill. A Bluff of St. Peter's Sandstone

human affairs that concerns us now. The disturbance here brought to the surface the coal measures, St. Peter's sandstone and the calciferous division of the Potsdam, the latter not appearing again within the confines of the State. La Salle is a great mining town and much of the coal is used in smelting zinc ore brought from Wisconsin, Kansas and Missouri. The Illinois and Matthiessen Companies' plants are said to be the largest in the world. Much glass is made from the St. Peter's at Peru, La Salle, Ottawa and Streator. The lower Potsdam is utilized in making Portland cement of excellent quality. East of La Salle where the Rock Island & Pacific R. R. has tunneled through a hill, the geographer can see the outcropping coal measures, the Trenton limestone, the St. Peter's sandstone and the calciferous division of the Potsdam. The industries of La Salle are directly attributable to this diastrophic movement of the earth's crust, which lifted the coal measures several hundred feet and exposed the early Silurian deposits, making mining easier and more profitable and furnishing abundant material for the manufacture of glass and cement. From the sulphur in the imported zinc ore much sulphuric acid is made as a by-product. So important are natural resources that several railroads and a canal at an early date competed for its traffic.

Rock River near Oregon, Ill.

By another of Nature's accidents the lower carboniferous and Devonian deposits are wanting in northern and northeastern Illinois. The absence of these formations exposes the Niagara limestone in many places, it being hidden only by the alluvial and drift deposits. As the later deposits and coal measures appear farther south it is quite likely that this region was not submerged below the great Paleozoic Sea, which covered the central and southern parts of the State, and in which the various formations of the Devonian, lower carboniferous and the coal measures were successively deposited. It seems almost providential that so useful a rock should have been left so near the surface, and in such abundance near the site upon which man should later erect one of the world's metropolises. The quarries of Joliet and Lockport constitute one of the leading resources of Will County, and furnish employment for hundreds of men. The excellent quality and abundance of building stone have curtailed the use of brick, Joliet stone being a staple building material in this section of Illinois. "Dimension stone" from this region is shipped to Chicago in large quantities. The Illinois penitentiary at Joliet, built of Niagara limestone, is a constant reminder to the traveler as he passes through the city, that the

A Geological Study near La Salle, Ill.

quarries constitute one of Will County's chief resources, and "breaking stone" has assumed a double meaning, especially to those whose interpretation of the meaning of freedom is too generous. The falls in the Des Plains River, the Niagara limestone, useful in building, in manufacturing lime, and in smelting, and the proximity of coal fields in Grundy and La Salle counties, have combined to make Joliet a thriving industrial and commercial center.

The great Drainage Canal of Chicago, considered one of the engineering feats of the age, owes its existence to the results of Nature's play. The retreating glacier left its last great barrier in the form of a semicircle, skirting the southern end of Lake Michigan, and known by the name of the Valparaiso Moraine. This barrier compelled the waters of Lake Michigan to find a new route to the sea, but the drainage from the surface of this ridge cut a notch through the soft drift and made a channel which carried the water southward to the Illinois. It is in the valley of this stream, the Des Plaines, that the Drainage Canal has been constructed at a cost of thirty-five million dollars. Thus, what at first seems to be a great achievement of man, on a more careful consideration, appears to be

Scene in construction of Drainage Canal. Niagara Limestone cut near Joliet, Ill.

only the discovery of one of Nature's great provisions, and the subsequent modification and adaptation of it to serve the needs of mankind.

Instances of physiographic influence could be multiplied. The illustrations given may, to some, seem trite, but they illustrate what the writer considers the richest and most productive phase of geographical study, and emphasize the value of the rational element as a co-ordinating and organizing principle. Mr. George D. Hubbard of Cornell University, in his paper, "A Case of Geographic Influence upon Human Affairs," submits a fine illustration of an agricultural adjustment to physiographic conditions in his study of the Shelbyville Moraine. The influence of physical environment on social life and customs has been discussed by Prof. J. Paul Goode in a valuable paper[1] on "Human Response to Physical Environment."

Modern educational methods react against formalism. The repetition of rules and formulæ is now subordinate and incidental to a comprehension of ideas. The laboratory method in science has substituted for the "letter that killeth," the "spirit which maketh alive." Even the study of a language, with its multiplicity of forms, is successfully approached from the thought side. Why should facts in geography be taught arbitrarily? The whole subject of physiography has to do with cause, and the responses of the organic world are results of effects of certain local sets of conditions. Thus, the "causal," or the "rational," is prominent throughout the subject of geography. Is not, then, this element the logical basis for organization? The value of types is manifest here as in other departments of science. But a type is only a concrete illustration of a general principle which obtains, in slightly modified form, in a multitude of instances. Its value lies in the fact that the student, through cursory examination and hasty comparison of the new example, recognizes the principle and classifies his information.

An instance of *readjustment* to physiographic conditions might be noted in northern Illinois, in the region of the Iowan glaciation. Here, in an early day, wheat was a leading product. Along the Rock River and its chief tributaries, the Kishwaukee and Pecatonica, flouring mills were numerous. The demands of wheat for phosphates and lime so impoverished the soil that its cultivation long since ceased. For some time wheat was imported from Minnnesota to keep these mills running, but the inability to compete with larger and better equipped plants near the wheat fields led to the complete abandonment of the industry. Some of the mills were converted into "feed mills," which found employment in winter but were idle in summer, or ceased to grind altogether. Many have either fallen or been torn down. In the larger towns, the mills, owing to a large production of oats in the region, became "cereal food" mills. The writer can remember when the Baltic and Big Thunder of Belvidere, Fisher's mill at Cherry Valley, and Shirley's mill were all busily engaged in the manufacture of flour. The Baltic and Big Thunder degenerated into feed mills, the Cherry Valley mill is idle, and only rusty shaft and crumbling stone now mark the site of Shirley's mill. At Oregon, on Rock River, one flour mill was burned, one has been converted into a cereal mill, and another, for many years idle, has recently become the home of a metal and plating company. Instances of this kind could be multiplied. Even as I write, almost in sight of my window, an old mill, weather-beaten and dilapidated, tells the story of industrial readjustment.

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[1] Elementary School-Teacher, January, 1904.

Unorganized geographical material has but little value and significance. The educational value of geography increases as the rational element is recognized. The work of the earlier geography is, indeed, to observe, to learn facts, and to gather material; though to some extent, even in this phase, the causal idea may be recognized. When, however, considerable information along various lines has been gained, it seems to be the true function of geography to induce from this information as data, definite general principles. The student may still continue to gather and learn facts, but the time has come when he should have a place to put these facts in orderly arrangement. This comparing and relating of data to strengthen and clarify meaning and to establish general principles which shall serve as categories for the reception of new material, constitute organization as applied to geography. A student who has mastered a few general principles, may then proceed to some extent in a deductive way. Knowing a few general truths relating to a region, he should be able to deduce with considerable accuracy the details of life conditions that prevail, and, looking backward, he should be able to read in outline its geological history. Is it not obvious, then, that the rational element, viz., reason and relationship, should be the major organizing principle of geography and that with the recognition of this principle will increase the educational value of the subject?

MODERN GEOGRAPHY TEACHING

The "Sailor Geography" of the past, with its burdensome details of isolated bits of information, has given way to methods that recognize geography as a logical study admirably adapted to train the perceptive powers, the imagination, the reason, as well as the memory of form and fact. While not necessarily the center from which all teaching should radiate, geography is easily and naturally correlated with other studies.—*Outline in Geography, Stockton, Cal.*

GEOGRAPHIC INFLUENCES IN THE ATLANTA CAMPAIGN

BY F. V. EMERSON

THE Atlanta Campaign is particularly interesting to the student of geography for two reasons. It was influenced in large degree by the resources and topography of the region and it was mainly conducted by generals in whom the "topographic sense" was very keen. Sherman and Jos. E. Johnston were strategists of the first order, who studied their territory with greatest care. Their movements were very largely logical results of earth control.

Sherman says that the march to the sea began with Chattanooga. This was the general's epigrammatic way of saying that the movement from Tennessee southward against the central Confederacy had been long in mind, but the way led through the mountain fortress of Chattanooga, the "shield of the Confederacy." Chattanooga lies at the point where the Tennessee River, coming down the broad Appalachian valley, swings abruptly to the west and cuts its way across the Cumberland plateau. Its valleys and gorges provided a natural pathway from the middle western Confederacy into the Tennessee valley. From Chattanooga railroads following the Appalachian valley radiated northward to Virginia, southward to Atlanta and westward across the plateau to the Mississippi. The possession of Chattanooga was therefore a military necessity to an invading army. Vicksburg had fallen, Gettysburg had been fought when Chattanooga was captured. The Western Confederacy had been sundered by the opening of the Mississippi. Its strength was concentrated in the armies of Lee in Virginia and of Johnston in Georgia. Sherman's task was to pierce the Confederacy to Atlanta and if possible lop off the rest, thus concentrating the fighting in the Atlantic States.

A course from Chattanooga to Atlanta and from thence to the Atlantic lies across three different geological formations, each distinguished by its characteristic topography. Chattanooga lies in the Great Valley, Atlanta in the Piedmont Belt and Savannah on the Coastal Plain.

The Great Valley, as has been noted in the previous paper of this series, is a structural one.[1] Unlike most valleys it is not the work of a river and its tributaries, but its existence is due to the fact that its rocks yield more readily to erosion and weathering than do those on either side. Along the valley belt is a series of upturned strata of limestones and shales; on the east are the resistant crystalline rocks of the mountains and on the west, the level strata of the Cumberland Plateau. Of these three formations the tilted strata of the valley weathered fastest and as a consequence the great trough stretches from Alabama to New York.

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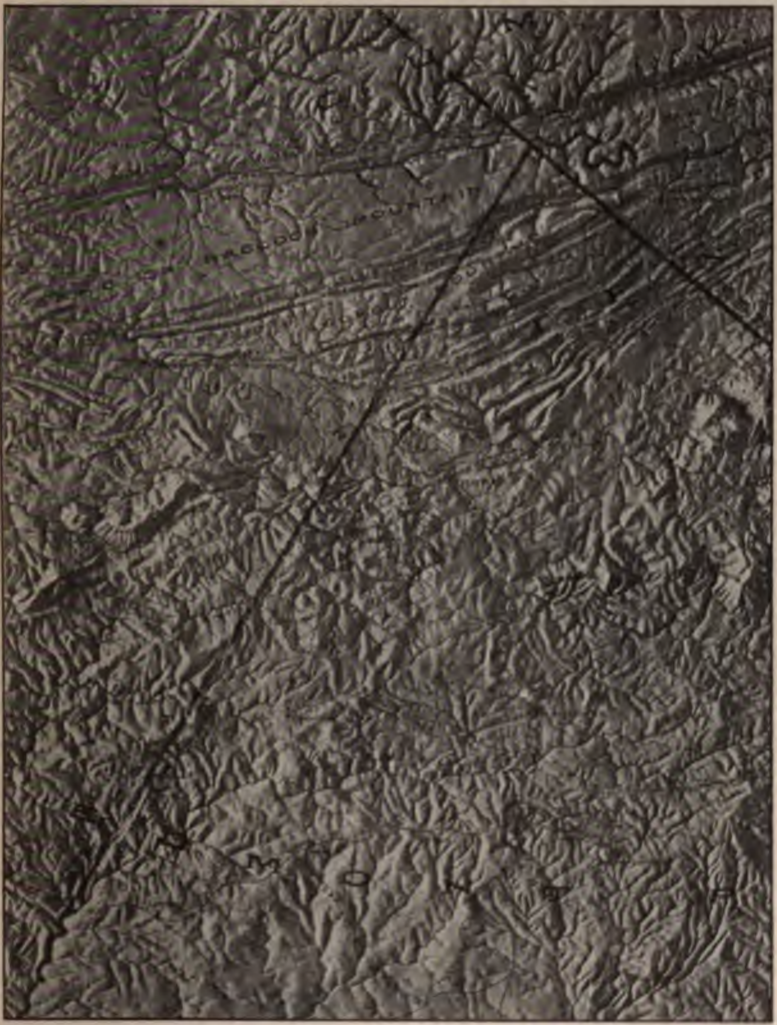
[1] Physiographic Control of the Chattanooga Campaign, Jour. Geog., Feb., 1905.



Relief map of the country from Chattanooga to Atlanta, showing the Cumberland Plateau, Appalachian Valley and Piedmont Plateau. (Photographed from E. E. Howell's model.)

In its southern part the Great Valley is itself divided longitudinally by minor ridges which are remnants of tilted strata which are more resistant than their neighboring strata. At its southern end the Great Valley widens, its ridges become less distinct or are represented only by fragments, and in Central Alabama the valley loses its identity and merges into the general surface of the Coastal Plain. Referring to the relief map the valley structure is at once apparent from its narrow ridges and parallel streams.

It will be noticed that the country east of the valley and south of the mountains changes in topography. Without any sharp dividing line the valley changes to the Piedmont Belt, so called, of course, from its position at the foot of the mountains. Again there is no sharp line of division between mountains and plateau. Indeed they are identical in structure but the plateau has suffered greater denudation and has lost its mountainous character. What remains of the former mountains are only the roots, so to speak; at least a mile of overlying rock is said to have been removed.

View of Piedmont Plateau looking southwest from the base of Lookout Mountain. The rolling surface is shown. (Photograph by the United States Geological Survey.)

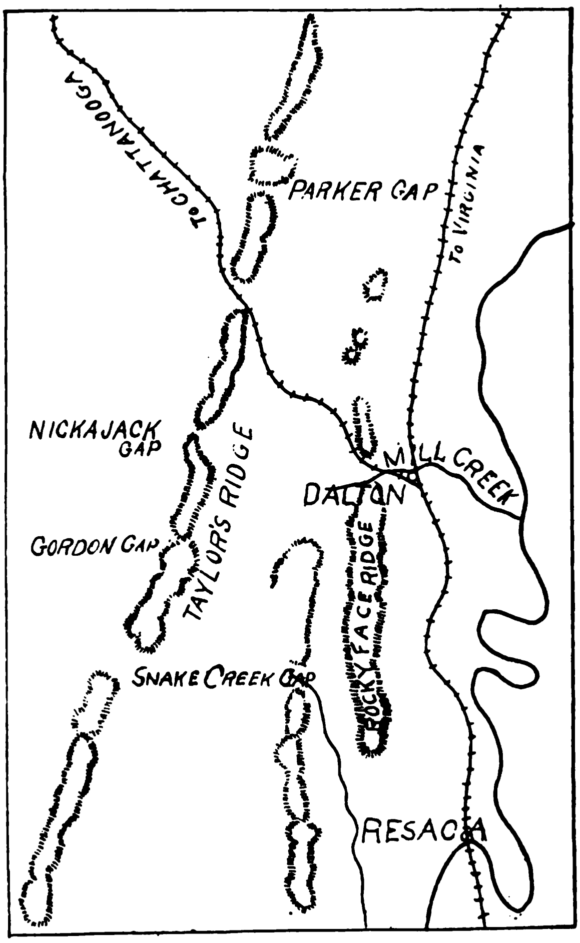
The Piedmont Belt flanks the mountains from New York to Alabama. Its soil is for the most part fertile, and, coupled with a favorable climate, made this region the granary of the Confederacy. The surface is rolling with a stream arrangement in marked contrast with the parallel streams of the valley, as the relief map shows.

The Coastal Plain flanks the Piedmont Plateau from which it is directly derived. The waste of the plateau has been carried eastward and southward to form the nearly level strata of the Coastal Plain. The strata slope gently seaward and in Georgia they form the sandy plains over which the army approached Savannah. The line of transition between Coastal Plain and Piedmont is marked by a series of falls and rapids where the streams descend from the hard rocks of the plateau to the softer ones of the plain.

In the winter of 1863, the armies of Sherman and Johnston lay in the northwest corner of Georgia in the vicinity of Dalton. Here the valley is about forty miles wide. The Great Smoky Mountains, an outlying range of the Appalachians, are its eastern wall and the Cumberland Plateau bounds it on the west. The characteristic valley ridges run northeasterly and in war times they were heavily wooded. The roads sought the valleys and only when absolutely necessary did they wind over the "mountains," as the ridges were called. The railroads crossed these ridges by tunnels, as at Tunnel Hill, near Chattanooga, or used the wind gaps or gorges which the streams had cut. The soil is productive but at that time much of the region was uncleared and neither army could subsist on the country. Both were dependent for supplies on the single line of railroad running from Chattanooga to Atlanta.

Johnston was an able commander whom the consensus of military opinion seems to have placed second only to Lee. His management of the Atlanta campaign has made it classic. It is difficult to get an exact idea of the strength of his army, as Johnston's estimate differs from that of the Richmond government, but it probably numbered between fifty and sixty thousand men. Sherman was a commander, bold but not rash. He was an exceedingly careful student of military affairs, giving close attention to feeding and marching as well as to fighting. Before starting upon this campaign he had from the census office a condensed statement of the resources of each county of each of the Cotton States. Swinton writes that he possessed the "geographical eye": "he invariably noted mountains, ravines and rivers and other features and their military importance." He had at the beginning of the campaign about one hundred thousand men.

Dalton was at the apex of a triangle, the eastern side of which was the mountains and the western side the Cumberland Plateau. Johnston's army was outnumbered and he was a hundred miles from his base of supplies at Atlanta, while Chattanooga, the Federal base, was but a few miles away. He lacked the advantage of interior lines such as were enjoyed by the Confederates in this region before the capture of Chattanooga. On the other hand, as long as he was on the defensive, Johnston had the advantage of position, and as we shall see, the country abounded in positions with strong defensive possibilities. He had a small army of slaves throwing up earthworks between Dalton and Atlanta, so none of his men need be detached for the purpose. Furthermore, his line of supplies ran through a friendly country and required few troops to guard it.



The Region about Dalton and Resaca

The Confederate position at Dalton was strong and well chosen. It is a railroad junction with roads leading to Chattanooga and Knoxville. Westward a short distance is a high, steep ridge of quartzite whose name, "Rocky Face Ridge," tells the story of its character. Near Dalton the ridge is pierced by the ravine of Mill Creek, a wild, rocky, picturesque gorge, with ridges projecting from the sides. The railroad passed through this gorge and then on down the vallley. The Confederates had mounted batteries on these ridges and had dammed Mill Creek, making the gorge impassable. Their works extended along the ridge and over the hills north of Dalton. Nature and military science had made the place almost impregnable.

Sherman determined the enemy's position by a light attack and decided that the place was too strong to be carried by assault. Instead he tried a movement which became typical of the campaign. Engaging the enemy with a portion of his army, with the rest he threatened Johnston's flank and line of supplies. This movement was a logical sequence of three factors: the widening valley, which made flank attacks possible; the fact that the Confederate army was dependent upon a single line of railroad for its supplies; and of course the preponderance of numbers in Sherman's army.

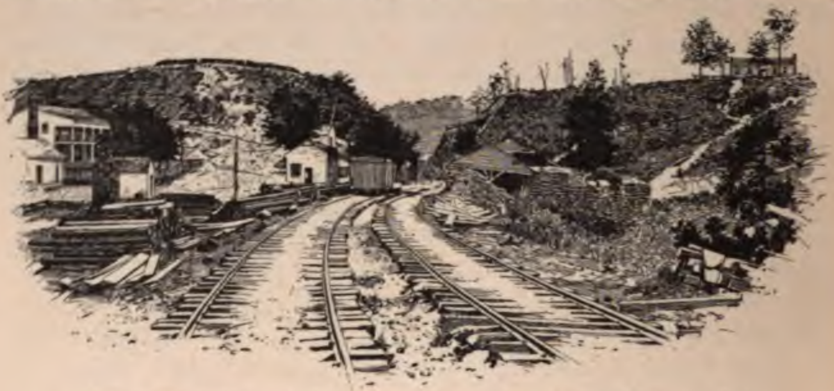
Southward in Rocky Face Ridge, about ten miles from Mill Creek Gap is Snake Creek Gap, a narrow defile which the geologists would call a "wind gap," a common feature in the valley ridges from Virginia southward. The name originated from the fact that a cool current of air usually flows through these depressions. The gap was formerly the valley of a creek which flowed across the ridge when the floor of the valley was at a higher level than at present; finally the valley floor on either side was lowered by erosion and weathering faster than the current could cut Rocky Face, and the stream was "bisected," one branch flowing northwestward and the other flowing to the southeast into the Conasauga River. The latter branch is called Snake Creek and gives its name to the ravine.

Either through negligence or lack of troops, Johnston had failed to fortify this door to the valley in his rear and Sherman, holding the enemy's army by a brisk attack along his lines, sent a corps through Snake Creek Gap to threaten or capture the fortifications which the Confederates had thrown up near the hamlet of Resaca during the previous winter. Sherman then leaving a force in front of the enemy strong enough to delay Johnston if he should attempt to move northward, took most of his army through Snake Creek Gap. The Confederate commander could not allow this concentration in his rear and quickly retreated into his intrenchments on a small plateau near Resaca. In anticipation of such an emergency roads had previously been cleared between Dalton and Resaca, so the movement was quickly made.

The turning of Resaca and the passage of the Etowah: Sherman "felt" of the Confederate position by a general attack, which was unsuccessful so far as carrying the position, but on Johnston's left a hill was carried and held, which commanded the railroad and wagon bridge across the river.

Sherman had secured a ford below the town and had advanced troops across the river and Johnston, fearing an investment of his army, crossed the Oostanaula by night, burning the bridge behind him.

From Resaca on the campaign was conducted on the Piedmont. It was a cotton growing region and was fairly well cleared. There were no protecting parallel ridges as in the valley, so Sherman hoped to bring on a battle here where there were few natural fortifications for Johnston's use. Johnston seems to have decided to try the issue of battle and took a position at Cassville, but suddenly he changed his mind, led his army across the Etowah and took position on the Allatoona heights. Johnston's critics seem to agree that this was his best chance to try a general battle, since Sherman had divided his army, sending a part to Rome. His reason given for not fighting was that two of his generals, Hood and Polk, advised against the battle.



Allatoona Pass looking north, Corse's Fort on the left. (Drawing loaned by Century Co.)

Near Allatoona the Etowah breaks through a worn down range of hills that were once part of the Appalachians. The railroad crosses the river near here and then bears to the southeastward. Thus the pass is the door to the region traversed by the railroad to Atlanta. Sherman had visited here in 1844 and had formed so high an opinion of its strength that he did not attempt to carry the position.

The Union commander continued his plan of moving by his right flank, but undertook a more elaborate campaign. His aim was to strike the railroad near Marietta, but since the railroad bears to the southeastward, the army would have to carry its provisions until a base could be secured. A base of supplies was established at Kingston, a town near the Etowah, where a branch railroad led to Rome, an important manufacturing town.

From thence the Federal plan was to move south to Dallas and then east along the watershed between the Etowah and Chattahoochee to the railroad. Johnston promptly met his adversary and chose a strong position near Dallas at New Hope church, where roads led to Atlanta and Marietta. The Union army had come across the country with only two days' rations. The occasion, therefore, demanded prompt action. An assault was ordered, but it was repulsed with heavy loss. Sherman now changed his tactics. The country was so wooded that in an hour after reaching a position, troops could strongly entrench themselves by falling trees, and soldiers behind breastworks were said to be able to repulse three or four times their number of assailants. The Federal troops would advance as far as possible and then entrench their position. Holding his own entrenchments and constantly skirmishing, Sherman extended his works eastward and Johnston was obliged to meet each extension to avoid being taken in flank.

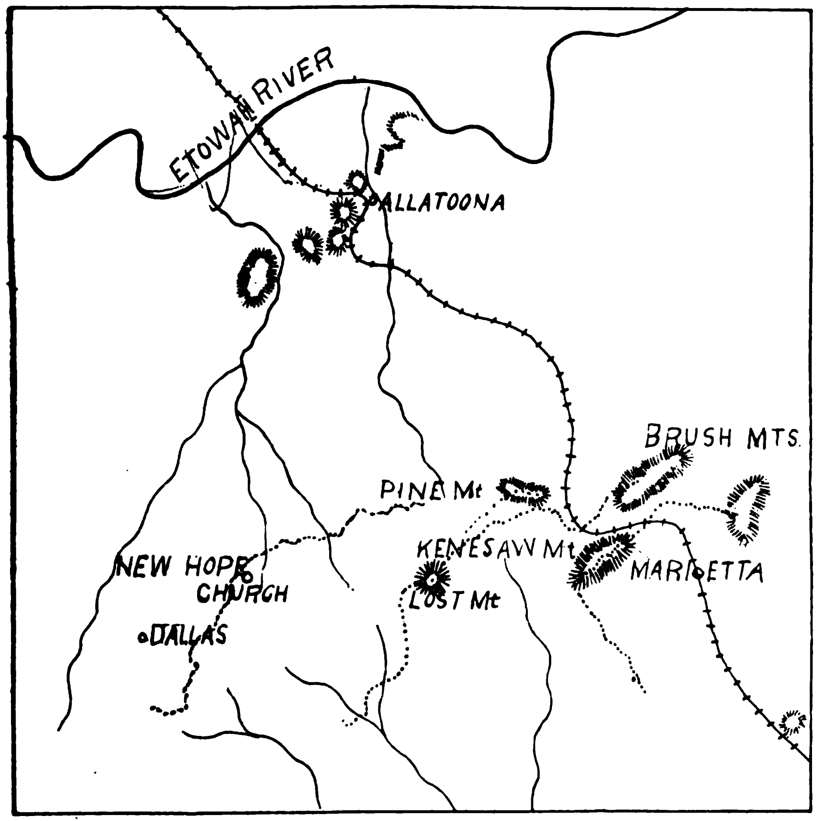
Breastworks near New Hope church, showing forested condition of country. (Drawing loaned by Century Co.)

Allatoona had been evacuated and was taken possession of by Federal cavalry under Stoneman. The railroad was repaired to this place, which was made a secondary distributing point to the troops. The two hostile lines kept stretching out their entrenchments until Johnston became convinced that his line was too thin to be maintained and he withdrew to a second line of works which had been prepared in advance.

The country about Marietta is interesting to the geologist because of many examples of residual hills or "monadnocks," as they are called. Lost Mountain, Kenesaw Mountain and Pine Mountain, near Marietta, and Stone Mountain, near Atlanta, are famous monadnocks. From the greater resistance of their rocks or from their remoteness from active erosion or perhaps from both causes, these masses have weathered less than their neighbors and stand overlooking the wreckage of the former mountains of the Piedmont plateau. Their military advantage is obvious and Johnston utilized them in his new line of defense, which included Lost and Pine Mountains, a line about ten miles long. However, before his line was invested, the Confederate commander abandoned his line, rightly judging it to be too long for his forces to support.

Kenesaw Mountain from the southeast. (Photograph by J. E. Murray, Marietta, Ga.)

Another line was in waiting and this being smaller was well manned. The center rested on Kenesaw Mountain while the flanks in either direction protected Marietta, which was a manufacturing town. Sherman, in investing the lines, found them very strong and well protected against assault. He could continue his flanking tactics and probably compel Johnston to retire. But he formed a bold plan. If he could attack the Confederate lines and carry the center he could probably demoralize Johnston's army then and there and end the campaign. Experience had shown that that part of a line which nature had marked as apparently impregnable is often defended by a small force, which can be overcome rather easily. At Chattanooga, Lookout mountain was a fairly easy capture for Hooker, and at Gettysburg, but for the accidental presence of a force that was coming to the field of battle, the Confederates would have taken Little Round Top, the key to the position. Thinking the risk worth while, Sherman hazarded an attack on all Johnston's lines but especially directed a blow at Kenesaw. Johnston was too wary a commander to be caught. The position was fully defended and the Federals withdrew with a heavy loss. Sherman was preparing to outflank the enemy, when his opponent, not caring to wait for the movement to be executed, retired and did not make a permanent stand until his army was south of the Chattahoochee.



Map of the region included in the campaign about Marietta. The dotted lines show the successive positions of the principal Confederate intrenchments

From Dallas to Marietta had been a unique campaign and the methods of warfare little to Sherman's liking. It had been a continuous skirmish, often, as he says, "without a dozen of the enemy being in sight." His average daily loss had been two hundred.

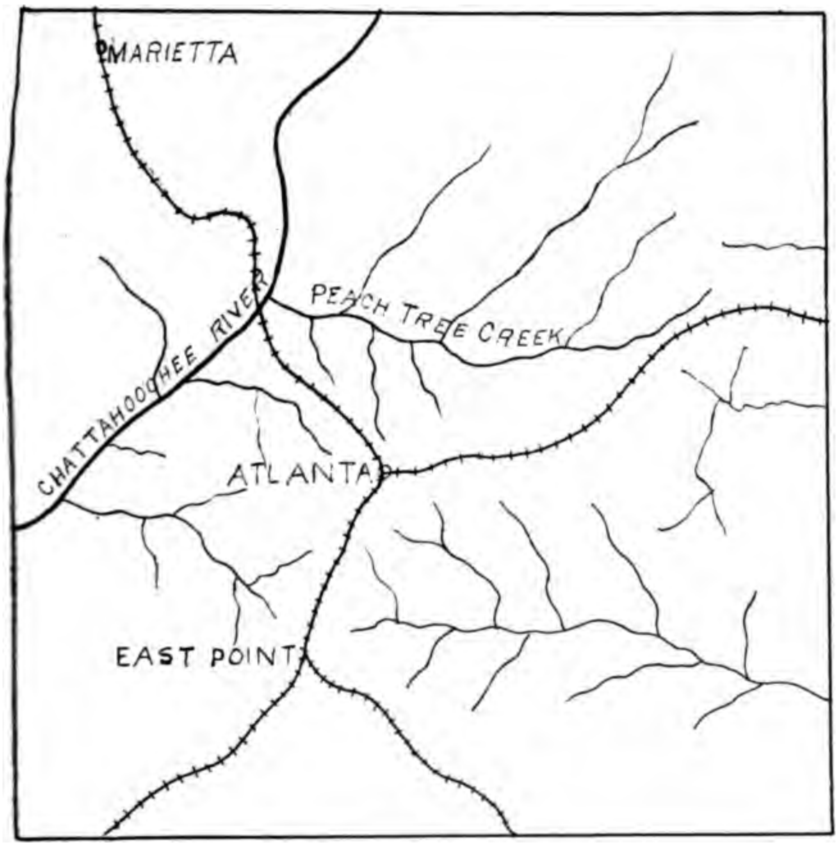
The Chattahoochee River runs several miles northwest of Atlanta: it is fordable in several places and is crossed by the railroad near the mouth of Peach Tree Creek, a sluggish tributary, flowing for some distance somewhat perpendicular to the river. Johnson made his stand on the hills south of the Chattahoochee, but did not guard the fords and crossings. Soon the enemy had a force across threatening his right flank. The Confederates retired to a strong line of works south of Peach Tree Creek.

The Federal army was now in sight of its goal, the city of Atlanta. The exact vicinity of Atlanta did not, like Chattanooga, have strategic advantage, but the region roundabout was extremely important. The Appalachians, broadening as they extended southward, constituted a barrier which up to 1880 was not crossed by a railroad south of Virginia. The commerce between the South Atlantic States and the west followed two routes: one led through the Great Valley, by way of Lexington, to Virginia, and the other around the mountains by way of Atlanta. The city was a center of communication for east, south and west. The plateau in Georgia and Alabama yielded iron and coal and the city was then, as today, the center of important iron industries. When the Union soldiers looked over the enemy's works they could see the smoking chimneys of factories that were turning out materials for the Confederate armies. There was a network of important manufacturing towns around Atlanta, among which were Rome and Marietta. Heretofore Georgia had been considered the very heart of the Confederacy. Its industries had gone on unaffected by hostile armies. Because of its seclusion the principal military prison of the South had been located at Andersonville, in the southwestern part of the state.

The city of Atlanta lies on the watershed between the Chattahoochee and Ocmulgee Rivers, the watershed at this point being parallel to the former river. The streams flow in opposite directions from the city. Those entering the Chattahoochee have cut steep ravines, which would be perpendicular to a line of defense, making it difficult to construct works and hard to move troops quickly from one place to another. To the eastward along the watershed was the railroad leading to Richmond. Southward a single road ran about five miles to East Point, where it branched, one branch going to Montgomery and the other to Macon.

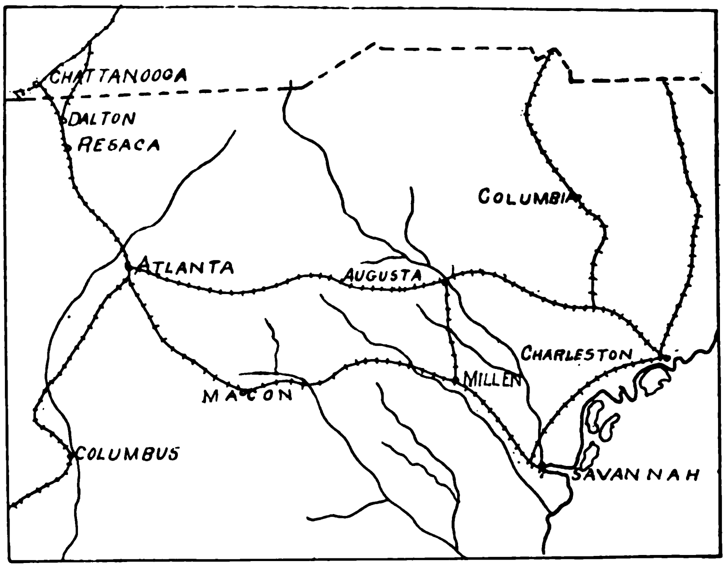
Johnston states that in the early stages of the campaign he did not risk battle, as a victory would have meant little and a defeat would have been disastrous. With each retreat his enemy was drawn farther from his base of supplies and was obliged to detach more and more men to guard his line to Chattanooga. He had hoped that Sherman in some of his flank movements would divide his army so that it could be attacked and the parts beaten in detail. Now it seemed to Johnston that his opportunity had arrived. Sherman's center was more or less stationary; it was necessarily near the railroad. Johnston planned to hold his strong works in front of the enemy with a comparatively small number of men and when the enemy attempted a flank movement to pounce upon him with a superior force.

Sherman studied his problem. By moving to his right he could threaten Atlanta's southern railroad connections and compel the enemy to operate in a country unfavorable for defense. But he would stretch out his own line and imperil his connection with the ever necessary railroad. Moving by his left flank he would have less distance to cover, but the streams ran parallel to the enemy's position. The latter was the line of operations he chose: it was the movement which Johnston had anticipated and as we have seen, was planning to resist.



Map of the vicinity of Atlanta

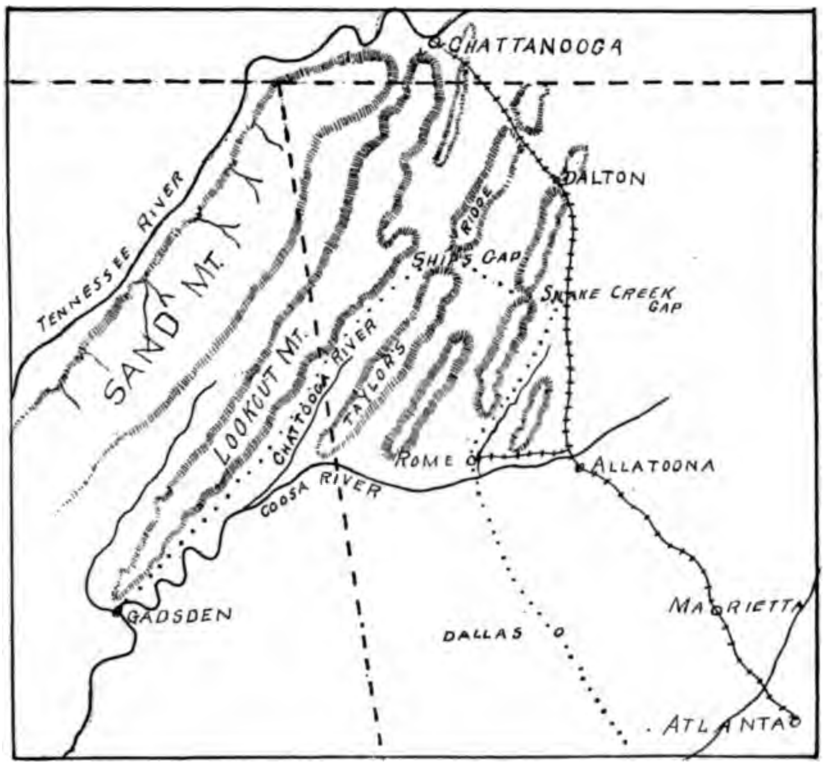
But Sherman's plans were made easier by President Davis. The Confederate government had become tired of Johnston's "Fabian policy" and he was replaced by General Hood, who had commanded a division of Johnston's army and had severely criticised his chief's defensive tactics. This change was a cause of rejoicing among the Union officers. It was understood that the patient, alert parrying of Johnston was to be replaced by an "aggressive" policy, for which Sherman had so wished and had tried to compel from his "astute adversary." The *post bellum* judgment seems to be that Johnston had conducted a wise and masterly campaign. Indeed, the most unstinted praise of his ability has come from his antagonist, who says in his memoirs: "No officer or soldier under me will question the generalship of Joseph E. Johnston. His retreats were timely and in good order and he left nothing behind." Another officer laughingly complains that "in all his retreats Johnston didn't even leave a mule behind."



Map of the region included in the Atlanta campaigns

In accordance with the policy imposed upon him Hood sallied out and attacked the Union left flank, but was repulsed with heavy loss. He then withdrew his army into the intrenchments about the city. McPherson's corps, protected by cavalry, continued the movement eastward and destroyed several miles of the railroad leading to Richmond and Sherman's first purpose had been accomplished. Taking fifteen days' rations he now began to move by his right flank in order to cut the railroads south of Atlanta. Hood fiercely attacked again, but was repulsed. The Union line pushed south, destroyed the railroads and Hood was forced to abandon Atlanta.

The apparent purpose of the campaign had been accomplished, but Sherman's ulterior purpose was to destroy or capture the army before him and then to march up the coast upon Lee. However, Hood's army of forty thousand men was very far from being destroyed. It was a constant menace upon Sherman's long line of supplies. The primary base was at Louisville; from thence to Nashville the distance was 185 miles; from Nashville to Chattanooga was 151 miles and from thence to Atlanta was 137 miles, in all nearly 500 miles, of which 300 lay through hostile territory. Every bridge, culvert and trestle had to be guarded and every train was accompanied by a repair force. One hundred and forty-five cars a day must arrive at Atlanta to maintain the army.



Map showing region included in Hood's campaign after the fall of Atlanta. His line of march is shown by the dotted line

Sherman's position was somewhat precarious. Every effort was made to accumulate at Atlanta sufficient supplies to maintain his army for a considerable time, even if the railroad should be broken. The enemy was fully alive to the importance of the Chattanooga road and soon Hood put his army in motion, crossed the Chattahoochee and the army in light marching order was soon in the vicinity of Marietta. Sherman followed with a portion of his army and from the heights of Kenesaw saw the smoke of the burning railroad twenty miles northward. Hood's main army was near Dallas, but a strong Confederate force was sent to capture Allatoona. Gen. Corse's there made a strong, successful resistance. It is interesting to note that the signalling between Generals Corse and Sherman was the basis for the well known song, "Hold the Fort for I am Coming."

Hood withdrew at the approach of the Union army and, turning northward, crossed the Coosa. The Oostanaula, a tributary of the Coosa from the north, was swollen by recent rains and protected his right flank. He moved upon Resaca but was not able to capture the place. Sherman was getting uncomfortably close and Hood, following Sherman's path of the previous campaign, turned west from Resaca through Snake Creek Gap and Ship's Gap and entered the Chattanooga valley. After the retreating army filed through the gaps, trees were felled across them so that pursuit was slow. The Confederate army, turning southward, proceeded to Gadsden, Ga. It was protected in the retreat by two physiographic factors: Taylor's Ridge on the east was an effective wall between him and the enemy, while the general southwest trend of the valley carried his army farther and farther from Atlanta. The campaign had been brilliant but fruitless. The broken railroad was soon repaired and trains were again running to Atlanta.

Sherman now had three courses open to him: he could hold Atlanta as a base and send out raiding forces into the surrounding country; or he could follow Hood in the hope of destroying the Confederate army; or, if Hood could be disposed of, he could carry out his cherished project of marching to the Atlantic seaboard.

Again the Confederates did precisely what Sherman wished. Hood started for Tennessee, hoping that his enemy would follow. The Confederates left the valley and crossed the Tennessee River at Florence Shoals, about one hundred and fifty miles below Chattanooga. Sherman detached General Thomas with a force strong enough to hold Hood's army and at once set about his famous march, first destroying the railroad from Chattanooga to Resaca, thus releasing the troops who were guarding the line and making it useless to the enemy.

From now on Sherman's primary object was to cripple Lee's army, which was besieged at Petersburg, Va., to cut off his supplies and finally to march northward and, if need be, attack in conjunction with Grant's forces. Three routes were possible; by Augusta to Charleston; southeastward to Savannah, or southward to some Gulf port. Sherman so maneuvered that the enemy was uncertain as to his route until he was well started.

The army of about sixty thousand was divided into wings which marched on parallel roads, covering a front of fifteen miles or more. About ten days' rations were taken in wagons, but these were rarely drawn upon. For once a Union army found itself in a country on which it could live. President Davis had aided materially in obtaining forage for the horses and men. Cotton was unmarketable because of the blockade and the Confederate president had issued a proclamation urging the people to plant corn instead of cotton. The appeal was heeded and as a result there was plenty of corn and fodder for man and horse. There was practically no opposition and the armies marched on the average about fifteen miles a day. Upon reaching the vicinity of Millen, Ga., the armies passed from the Plateau to the Coastal Plain. The soil became sandy and less fertile and supplies were scarcer. On the river bottoms rice and rice straw were foraged instead of corn and corn fodder. The food supplies in the wagons were drawn upon and well nigh exhausted, and had it not been for the junction with the fleet at Savannah and absence of resistance to the march, the Union army would have been seriously embarrassed for food. The falling off of plentiful supplies on the Coastal Plain compelled the Federal officers to dismiss the slaves who followed in large numbers.

The entire march was devoid of important engagements. On Christmas day, 1864, Sherman reported the evacuation of Savannah. The movement had been at once *felt* by the Confederate soldiers in Petersburg in their reduced rations. A path sixty miles wide had been cleared of anything a hostile army could use. Atlanta had been captured, the Confederacy had been again sundered and the purposes of the great march had been accomplished.

HISTORY AND GEOGRAPHY

History is full of the great movements of humanity that have developed outbursts of intellectual development—indeed it is these same movements that constitute history. And no matter what may seem to be the intermediate cause, the real motive may be traced always to the same incentive—geographic environment.—*J. W. Redway, in New Basis of Geography.*

LABORATORY WORK IN PHYSICAL GEOGRAPHY IN SECONDARY SCHOOLS*

BY CLARA B. KIRCHWEY

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THE geography of to-day or the "new geography" as it is called, burdened by its inheritance from the past and by its own shortcomings, has a reputation difficult to live down—that of being simply an information subject. Until very recently it was primarily what its definition implied—a description of the earth's surface—and although we have passed beyond the letter of this definition, the spirit still persistently lingers. Geography is still too widely taught as an information subject. The "six pages a day" method may acquaint a pupil with the words within the covers of his text book, but it will not teach him geography, and fortunately will no longer make it possible for him to present himself as a candidate for college entrance in physiography.

The day is long since past when instruction in chemistry, physics, or biology was confined to the printed page. The instructor in these sciences realizes the inadequacy of words in conveying ideas and the need of investigation on the part of the pupil that he may arrive at an understanding of the underlying principles.

This attitude is as essential to progress in geography as it is in biology. Geography, too, is a science, and must be granted the prerogatives of a science. The subject, correctly handled, has great possibilities for mental discipline; as it is often treated these possibilities are so obscured that they are visible only to those familiar with the field. We can scarcely wonder that the uninitiated still see in geography a mass of unrelated facts and refuse to give credence to the argument that its disciplinary value is equal to that of the other sciences.

Geography labors under more or less of a disadvantage, owing to the fact that its problems are not such as can be analyzed under the microscope or studied in the test tube. We cannot bring our material for study within the walls of the school room, nor can we go where we will in pursuit of geography. We are therefore forced to content ourselves, to some extent at least, with the shadow, the substance being unattainable, and with the laboratory rather than the field as our *locus operandi.*

To the laboratory then, and to laboratory work must be entrusted the task of so organizing the subject that the process of accumulating information may be accompanied by true mental discipline. When this is accomplished the less important task—that of establishing the position of geography among the other sciences—will require no advocates. Cause and effect have been operative in the past in determining the standing of geography and may be depended upon for the future.

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*Read before Earth Science Section, New York State Science Teachers' Association, 1904.

In order to make laboratory work effective an elaborate equipment is not essential, but a realization of what may be accomplished by this method is absolutely necessary, that its end may not be defeated. That so-called "laboratory work" covers a multitude of sins at the present time may be seen by an examination of the laboratory note books presented by the candidates for admission to college. Many of these exercises have no place in such a category. Class discussions, bearing no evidence of investigation of any description on the part of the student, are frequently submitted. Exercises, performed by the teacher and copied by the pupils, are also presented, apparently with no intention to deceive either on the part of the instructor or the student, but rather from a misconception regarding the true meaning of laboratory work.

While the leaders in the field are agreed that there should be laboratory work and that it should be disciplinary in character, the greatest diversity of opinion prevails among them regarding the exact nature of this work and the best mode of presentation. This lack of agreement is made evident in the manuals which have been published within the last few years. The various possibilities in regard to the choice of material and in the method of treatment have not been weighed that some common ground might be reached, but each author has emphasized the subject or subjects for which he has some special preference. The result is a collection of books, no one of which should be used alone as a laboratory guide. Until we have a greater unanimity of opinion among those who would shape the destiny of geography we must not expect systematic, well-ordered work on the part of the teacher whose training has not given him a broad outlook over the subject, nor can we expect unsystematized work to result in well disciplined minds.

There is some excuse for the fact that the work is not well apportioned among the various departments that constitute physical geography. The subject, embracing *"The Earth as a Globe," "The Atmosphere," "The Ocean," "The Lands"* and *"The Distribution of Life"* is much too extensive to be covered from the laboratory standpoint or even with a sufficient amount of emphasis on laboratory work in the period of time usually allotted to it—*i. e.*, one year, with three or four periods weekly of perhaps forty minutes each. This has been attempted for several years, the result being work too superficial to be satisfactory to the instructor, not thorough enough to give the student a clear understanding of the subject, and less intensive than he is capable of performing.

In view of these conditions it seems desirable that some common method of elimination be adopted that in time we may arrive at a greater uniformity of treatment and at more satisfactory results. The basis of selection should naturally be that of true educational value primarily. It is therefore necessary that each department of geography be submitted to a critical examination, that its relative value from this standpoint may be determined.

The fundamental division of the subject, *The Earth as a Globe,* usually regarded with equal aversion by both instructor and pupils, lends itself admirably to laboratory treatment and so taught it is seen to be so full of vital problems that it is impossible to look upon it as a dry subject, or one which is pursued simply to fulfill a requirement. The pupils may regard it as difficult, for each point must be thoroughly grasped before further progress may be made, and before any truth becomes a permanent possession, close thinking and frequently a considerable power of visualization are required. This is "hard" in the process but its accomplishment illumines the subject as no amount of class discussion or assigned reading can succeed in doing, and that which would otherwise be true on the authority of the teacher or the text, becomes so to the understanding.

Perhaps the problems of greatest difficulty in the treatment of the Earth as a Globe are those based on the effects of the revolution of the earth about the sun. The distribution of light at different seasons and at different latitudes may be memorized, but memory work is so transparent that a modification of the usual form of the problem will expose it. If a pupil truly realizes the combined effects of revolution and the inclined axis, that axis may be inclined at any imaginary angle without causing confusion to his mind. If it be grasped, not memorized, that the inclination of the axis determines the width of the zones he will not be at a loss if he be confronted with an earth in which the axis has an inclination of 30° or 40° and the number and width of the various zones are left for him to determine. The varying lengths of day and night at different latitudes, as at the equator, the polar circles and the poles, another problem involving difficulties, when approached in the laboratory from the side of light distribution, needs little explanation on the part of the teacher.

These problems may be solved without an expensive laboratory equipment; a season apparatus is of course desirable as the basis for this work. If this cannot be secured, small globes, together with circles of illumination, cut from paper, will be found a good substitute; indeed, this should be used even if the more elaborate apparatus be available.

If time permitted it might be shown that it is possible to develop practically this entire subject in the laboratory, leaving for the lecture or discussion the summary, amplification and application of the results reached through individual work.

Another department well adapted to laboratory treatment is that of *The Atmosphere,* and no subject should be more thoroughly studied. The material for this work is always at hand, furnishing a field for investigation that cannot be surpassed.

In the study of the atmosphere the pupil is largely independent of the teacher except for guidance. A clearer conception of temperature distribution may be gained from the study of isothermal maps than from a lecture. The problems should be formulated with care by the teacher, but the solution should be left to the pupil. A similar mode of procedure in regard to the distribution of pressure will show not only the variation of pressure over the world but the reason for that variation, with the single exception regarding the cause of low pressure at the poles.

Familiarity with pressure should carry with it ability to cope with the next problem—that of the various wind systems. The pupil should be required to sketch the approximate direction of the winds in the various belts, not alone in the fundamental planetary system but in that of the terrestrial as well, judging of wind direction from his knowledge of the distribution of pressure and the direction of deflection. The results should be verified and corrections made when necessary. The study of the distribution of rainfall should be causal also, the interpretation of the rainfall map depending on the knowledge of wind direction and surface features.

The series of questions which follows indicates more definitely the mode of procedure recommended and the close causal relationship existing among these various topics. The problems are based on climatic maps which may be found in Longman's New School Atlas.

ISOTHERMS FOR JANUARY

1. Record the temperature of the eastern coast, the western coast and the interior of North America along the parallels of 30, 40, 50, 60 and 66½ degrees.
2. Record the temperature of the eastern coast, the western coast and the interior of Eurasia along the parallels of 40, 50, 60 and 66½ degrees.
3. Compare the temperature of the east and west coastal regions of North America; compare each coast with the interior; compare

the east and west coastal regions of Eurasia; compare each with the interior.

4. What is the trend of the isotherms in the interior of these continents? Over the adjacent oceans? Suggest the reason for their irregularity.
5. Where is the coldest land area found? What is its temperature? Where is the warmest land area found? Record its temperature.
6. Compare the trend of the isotherms in the northern and southern hemispheres. Explain.
7. On an outline map of the world indicate the position of the heat equator.

After a similar study of the distribution of temperature over the world for July, followed by that of the yearly average, the distribution of pressure is noted.

ISOBARS FOR JANUARY

1. Locate the equatorial low pressure belt. What is the average temperature of this area? (See isothermal map for January). Where is the pressure lowest in this belt? What is the temperature of these areas?
2. Locate the barometric equator. Compare its position with that of the January heat equator.
3. Locate the north tropical belt of high pressure. Describe the temperature of this belt. Where is pressure highest? What is the temperature of this area?
4. Compare the south tropical high pressure belt in extent and continuity with the north tropical. Explain.
5. Describe the pressure about the poles.

After a similar study of the distribution of pressure for July and for the year the pupils should state what relationship they have discovered between temperature and pressure and what exception to this relationship appparently exists. This exception, low pressure at the poles, must be explained as the cause cannot be discovered in the laboratory.

The study of pressure is immediately followed by that of the wind systems.

WINDS

Planetary:

Draw a circle representing the earth. From your knowledge of the average distribution of pressure over the world for the year and of the law of deflection, show the approximate direction of the winds.

Verify from consultation of wind chart and correct errors.

Terrestrial:

Construct two diagrams showing the effect of the migration of the heat equator upon the planetary wind system.

(Diagrams should represent the distribution of winds for January and for July).

Moonsons:

Draw two outline maps of India. In each case represent the mathematical equator. On one map represent the heat equator for January and the consequent distribution of winds for the same month. On the second map represent the heat equator and winds for July. Verify as before and correct errors.

RAINFALL

1. Account for the amount of precipitation in regions of greatest and least rainfall.
   (Consult map of winds and physical maps, as well as rainfall maps.)
2. Compare the extent of desert regions of the eastern and western hemispheres. Explain.
3. Locate the great trade wind deserts.
4. Explain the distribution of rainfall along the western coast of South America.
5. Compare the amount of rainfall east and west of the 100th meridian west of Greenwich. How have life conditions in this section been influenced by the amount of rainfall?
6. State the amount of rainfall of the Great Basin region of the United States. What influence has the light rainfall had upon the drainage of this section?

These exercises have been formulated to show the causal relationship existing between temperature and pressure, pressure and winds, winds and rainfall. They are typical, however, not only of the work on the atmosphere but also of that of the other departments of the subject, to the extent that they emphasize causes and consequences.

Neither department of geography which has been considered has held as prominent a place in secondary school education as has that of *The Lands.* We are told that this topic should be emphasized, for the land is the home of man and pupils must therefore be made familiar with it.

If this subject be examined from the standpoint of its educational value, we may not feel so confident that it is entitled to as much attention as it has received in the past. The field is so broad and is so detailed that to approach it through the laboratory is somewhat appalling unless the time devoted to geography be greatly extended. Moreover, the laboratory seems to fail us here to some extent, for, instead of furnishing a field for the interpretation of the most difficult problems these must be reserved for the lecture. The simpler problems, such as the characteristic surface features of a plain, a plateau, a mountain, etc., may be studied with profit, also the various stages of development of these land forms. Only a comparatively small portion, however, of all that our texts usually require, can be taught in the laboratory. For example, the high school pupil is supposed to be familiar not only with the characteristics of plains in general, but with the divisions and subdivisions of plains. He must know not only coastal, alluvial, and lake plains, but the characteristics of narrow, broad, belted, belted inland, and embayed coastal plains. The distinguishing features of all of these various divisions and subdivisions cannot be arrived at successfully through the laboratory. It is difficult to see how a pupil could determine the development and the characteristics of a belted plain from map study. In considering the various classes of mountains similar difficulties are met with. The attempt to analyze the various forms from map study is unsatisfactory, for in most instances these forms are so modified that their characteristic features are obscured.

These same conditions exist to a sufficient degree in the various topics that must be considered to render laboratory work as the basis for class work practically impossible. Moreover the amount of detail necessary for the appreciation of many of these subjects is so great that it seems almost necessary for the text-book or for oral instruction to lead rather than for the laboratory. The chief function of laboratory work must therefore be that of illustration wherever it is possible to clarify a subject through the study of maps, models or photographs, or to summarize some portion of class work.

There is a distinct mental relaxation on the part of the pupils when land forms are reached. The weaker student who has found the preceding work beyond him, or practically so, is almost invariably able to cope with this department without great effort. The reason for this is apparent. The subject matter, though voluminous, is not difficult. The method of work, enforced by the nature of the subject, demands much less of the pupil, the close, sustained thinking which the previous work has required being no longer necessary, so small a portion of the work being really independent investigation.

In view of the fact that it is an impossibility to cover satisfactorily the entire course of physical geography as outlined for secondary schools by the lead [illegible] would certainly seem advisable to cut down the requirements on land forms decidedly for the reasons mentioned. If much of this subject were reserved for college and were studied after the student had some knowledge of geology, that the relation between structure and surface might be emphasized, its disciplinary value would be greatly increased.

It is therefore recommended that secondary work on land forms be confined to the larger features, leaving for more advanced study the careful analysis of these various forms; *i. e.,* the various classes of plains and their development should be studied, but not the subdivisions based on structure—as narrow, broad, and belted coastal plains; mountains and their development, but not block, folded, domed and massive mountains; plateaus and volcanoes, together with their development, but not the subdivisions of these forms. The two classes of shore lines should be emphasized, owing to the strong influence which they exert upon the development of human life. Many other topics belonging to the lands should be subjected to the same process of reduction. Rivers, for example, should be studied as young, mature and old, while their classification as consequent, subsequent, obsequent, antecedent, superimposed, engrafted, dismembered, etc., should be reserved for the college. By thus limiting the field an opportunity for better training would be afforded, for the subjects chosen might then be approached through the laboratory, time for investigation being adequate or approximately so, and the subject being of a nature to admit of laboratory treatment.

The next department of geography for consideration, *The Ocean,* has never held an important position in the course from the standpoint of the time devoted to it. Many of the problems to be considered, however, can with advantage be presented in the laboratory, the subject affording, therefore, an opportunity for some independent work that is valuable. The omission of two or three problems that must be largely descriptive on the part of the instructor, as that of the movement of water particles in a wave, or the detailed and involved explanation of tides, would certainly be no detriment to the course, and would afford an opportunity for the study of topics more valuable to secondary pupils, as those relating to the relationship between ocean temperatures and the movement of ocean waters, the dependence of the direction of ocean currents on the prevailing winds, etc.

The final department left for discussion is that of *The Distribution of Life.* If the work has been well done throughout, life relations have been constantly emphasized. The response of life to its environment, however, whether it be water, land or atmosphere, should be studied when that environment is studied, *i. e.,* when climate is considered, its effects upon life should be traced; when seashores are considered the influence of shore-lines upon the development of peoples naturally follows. If life relations be studied in connection with each topic considered throughout the work on *The Earth as a Globe, The Atmosphere, The Lands* and *The Ocean,* it will be found unnecessary to treat it as a separate department to be discussed after the completion of the study of the physical environment, as is customary.

Moreover, this department of physical geography is naturally impossible from the standpoint of the laboratory; and while the argument is not advanced that no mental discipline is involved in the pursuit of such a subject, the claim is made that less discipline results than where independent thought work is absolutely required.

Geography taught by the laboratory method must necessarily be stripped of much that is generally thought to be its most interesting side. If this were true it might still be worth the sacrifice. That the opinion is erroneous will be asserted by those who have investigated and fairly tested this method. The process of solving a problem for which there is a sufficient motive is always interesting to every active minded boy or girl.

The laboratory method, moreover, is disciplinary in its character, affording opportunity for pupils—"To proceed by observation and experiment, by guarded hypotheses and careful verification, from the known to the unknown, on the well-founded assumption of the uniformity of nature."

A student cannot pursue a subject in this manner without gaining a large fund of information which has some value. His chief gain, however, lies in the attitude of mind, which must follow the constant weighing of causes and consequences, in the independence which this work promotes, and in the power which results from the successful accomplishment of a task and the immediate application of the principle deduced to the interpretation of new problems.

And, lastly, geography taught by this method will make for itself a place among those established sciences whose aim is not information primarily, but an attitude of mind which the study of a science according to the methods of science alone can give.

THE SCOPE OF PHYSICAL GEOGRAPHY

The meaning and general scope of physical geography have never been better expressed than in the words, "the physical environment of man."—*Report of Committee on College Entrance Requirements, 1899.*

SOME CONTRIBUTIONS TO LABORATORY PHYSIOGRAPHY *

BY WM. F. LANGWORTHY
Colgate Academy, Hamilton, N. Y.

THE educational world has been slow in recognizing the importance and practicability of laboratory work in Physiography. At last the time seems at hand for its general introduction. Many, and perhaps most, educators will agree that as much attention should be given to laboratory work in this subject as in Physics or Chemistry.

I have been asked to describe two or three exercises which I have planned or have found especially valuable with my classes. I do not feel that I could do this helpfully without some general suggestions as to laboratory work.

In the first place, it seems wisest to use both laboratory and field exercises in connection with a good text-book. The observations in the field make clear many facts otherwise only indistinctly understood, and develop an intelligent interest in nature. Work in the field should proceed side by side with laboratory work.

The laboratory exercises should be distributed as generally as possible over the different parts of the subject. Equipment with topographic maps and all that is necessary to carry on work with them is very easily and economically provided. Probably this fact, as well as the importance of the work itself, will make such work very prominent in any laboratory course. In our own State these maps are coming from the survey with great rapidity and make work on the home map possible in an increasingly large number of localities. I find it a good plan to begin work on maps with a comparison of different ways of showing relief and attempt to bring out as clearly as possible the advantages of the contour map. With the topographic map of our locality before the class, definite questions are put as to scale, contour interval, features shown by brown, black, and blue ink, etc. This is followed by a change of a part of the map to a hachure map. Students find this hard because of a failure to understand hachure maps. One or two profiles are then constructed across our village, taking pains not to exaggerate the vertical scale too much. These profiles cover territory which students go over in the field with map in hand. Various features revealed by profile are then discussed. For instance, the student's attention is called to the fact that the valley in which Hamilton is situated is an open, mature valley. Our profile, however, crosses two branch valleys

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* Read before the Earth Science Section, New York State Science Teachers' Association, December, 1904.

which are young and one which is fairly well developed. Another feature emphasized is the rounded summits of the hills, with causes. Other exercises on the home map follow until the student becomes familiar with its details as seen in field and represented on map. The student is then ready for the study of other maps, and this work has been made more easy and tangible.

So much improvement has been made in training pupils in drawing and map making that we find it possible to require much work of this kind. I prefer it to using outline maps already prepared. Of course, these maps lack accuracy of detail as compared with printed outline maps and consume much time in construction, but the knowledge of one doing the work seems to be increased much faster.

The following are some of the exercises which I give my classes after they are fairly well advanced. Each of these exercises requires two fifty-minute periods for its completion. The first is an exercise on the "River Basins and Divides of New York State:"

1. Construct outline map of New York State and trace divides separating St. Lawrence, Hudson, Delaware, Susquehanna, and Mississippi drainage.

2. With crayons color St. Lawrence basin blue, Hudson red, Delaware blue, Susquehanna yellow, and Mississippi red.

3. (a) What is the highest elevation in the State?
   (b) Is New York a high upland?
   (c) Is the fact of the wide dispersion of its waters unusual?

4. (a) Near what divide do we live?
   (b) What is its elevation in our valley?

5. (a) What is the average slope from source of Oriskany Creek to where it empties into the Mohawk?
   (b) For whole distance from Bouckville to tide water?

6. (a) What is the average grade in our valley from divide to Binghamton?
   (b) From divide to Chesapeake Bay?

7. (a) What is the result of this condition?
   (b) Do you see any evidence of this on Morrisville sheet?

The next exercise deals with the "Temperature and Precipitation of New York State."

1. From charts in Annual Reports of New York State Weather Bureau and the New York Section of the Climate and Crop Service of the Weather Bureau for the past ten years determine average annual temperature and rainfall at Hamilton. Arrange data in table.

2. Why do isotherms bend to the north in the Hudson Valley?

3. How much lower is the average annual temperature in the Adirondacks than in the St. Lawrence Valley? Account for this.

4. Where is the highest average temperature in the State found? Explain.

5. How does the average rainfall in the Adirondacks compare with that at the east end of Lake Ontario? Explain.

6. In what parts of the State is the heaviest precipitation found? Explain.

The last exercise is a "Study of the Cucamonga, California, Map."

1. Locate Cucamonga map on general map of California.
2. How many square miles of land is covered by it?
3. What is the contour interval?
4. (a) What mountains lie to the north?
   (b) What is their elevation and character?
5. (a) What mountains lie to the south?
   (b) What is their elevation?
6. What is the length, width, and elevation of this valley?
7. (a) What is the average slope per mile from Cucamonga Peak south for four miles?
   (b) What is the slope from foot of mountains south to Cucamonga?
8. Make profile from Cucamonga Peak to Cucamonga.
9. What do you know about the rainfall of this region?
10. How does this find expression in streams from mountains?
11. (a) Are most streams lowering their beds?
    (b) How about these?
12. (a) What relation to the mouths of the gorges do the contours have?
    (b) How do you explain it?
    (c) What do you call such topographic forms?
    (d) Notice distributaries.
13. (a) What do you know about the climate of this region?
    (b) What alone is needed to make it exceedingly fruitful?
    (c) What measures are taken to obtain water for irrigation?
    (d) What has become the chief industry?
    (e) How valuable is the land?
14. Recapitulate the conditions which make this region especially favorable for the formation of alluvial fans and cones.

In conclusion I wish to say that in secondary schools the laboratory work in Physical Geography should be very simple and elementary. We often underestimate the difficulties of beginners. Our work should be definite. Otherwise discouragement is sure to result. Do not take a pupil into the laboratory, place a map before him and ask him to explain what topographic features are shown. Skillful questioning will bring him to the correct understanding of the problem presented. To illustrate what I mean, be careful to insure a good understanding of the flood plain feature of the Mohawk at Utica and the Mississippi at Donaldsonville, La., before you expect him without the aid of definite questions to discuss those of the Missouri at Marshall, Mo. Do not undertake map excursions, so called, until the student is well advanced. There is an exactness of relations between cause and effect in Chemistry and Physics which is to some extent lacking, or perhaps imperfectly understood, in Physical Geography, and we need to guard against bewilderment by using especial care to guide our pupils by a large number of pointed questions. If this is done, I am sure we will be pleased with their development.

NEWS ITEMS

INTERNATIONAL COMMITTEE ON EDUCATIONAL GEOGRAPHY.—As an outcome of the meetings of the educational section of the Eighth International Geographical Congress held in this country in September, 1904, an international committee has been formed under the leadership of Professor Heinrich Fischer of Berlin to promote the advancement of educational geography. The committee arranged for by Professor Fischer includes, besides the chairman, who will represent Germany, Professor Oldham of Cambridge, England, for the United Kingdom; Professor de Martonne of Nancy, for France, and Professor Dodge of New York city, for the United States. The committee will publish, at least biennially and perhaps annually, accounts of the progress made in educational geography in the different countries represented. These reports will be published in the existing educational journals and should be of much service to all who would keep in touch with the best in geography teaching.

SUMMER WORK IN GEOGRAPHY.—The May number of this Journal will contain the usual annual summary of the summer school opportunities in geography offered in the universities and leading normal schools. The Editor will be glad to receive printed outlines of normal and college courses in geography at an early date.

EDITORIALS

NEW ASSOCIATE EDITORS.

WE take pleasure in announcing that hereafter the Journal will have the active assistance of four new associate editors—Supt. W. W. Rupert of Pottstown, Pa.; Supt. James A. Barr of Stockton, Cal.; Supt. W. N. Clifford of Council Bluffs, Iowa, and Supervisor R. H. Whitbeck of the Model School of the Normal School, Trenton, N. J. These men are widely known for their effective work in school geography and will be able to contribute much of value in making the Journal practical and usable. The superintendents in general make the courses of study and control the effectiveness of the geography work in the schools under their guidance. Hence contributions from superintendents who have made advances in school geography will be of great assistance to the superintendents who may be a bit skeptical of the suggestions made by geographers unfamiliar with the practical school problems the school superintendent has to consider.

MEMORIZING IN SCHOOL WORK

For many years the leaders in school geography have been rightfully advocating the introduction of rational causal geography as being more valuable and disciplinary than the old fashioned memoriter work so abundant a generation ago. As a result many teachers have gone so far as to drop all pure memorizing from their school geography, believing that no location should be taught except incidentally in association with some topic developed causally. As a result pupils do not in many cases gain any clear ideas as to the location of even those places or geographical features which they must know in order to read the daily papers understandingly. It would be very delightful if all the knowledge of location necessary in daily life could be developed in a causal way. Unfortunately, however, the time that can be devoted to geography in the present crowded curriculum is altogether too small to allow such an extensive study of the world as this method of procedure would call for. Hence there are certain facts of location which a child must know and which he cannot get except by deliberately memorizing them. Such facts are not very many, but they are important and are a sufficient excuse for the introduction of pure memorizing in limited quantities even though modern educational ideals do not include such work.

Facts that must be learned in this way must be learned quickly and surely. "They must be driven home to stick;" and this means memorizing without any attempt at rational location in many instances.

Memorizing also is valuable because it calls for concentration and prevents careless work on the part of the pupils, particularly in large classes. Thus pupils will at least gain from such work the ability to apply themselves to an uninteresting task, as they will probably have to do daily in after life.

We hope to present within the next few months suggestions as to the minimum knowledge of location a pupil must be expected to gain from his school geography. Such suggestions will give at least a basis for formulating where the line must be drawn between rational memorizing and pure memoriter work in school geography.

THE EQUIPMENT FOR PHYSICAL GEOGRAPHY IN HIGH SCHOOLS

In spite of the increased demands for better geography teaching, for better trained geography teachers and for more attention to the equipment of geographical laboratories in high schools, and in spite of the greater attention being given to scientific geography in the better high schools of the country, it still remains true that geographical laboratories in high schools are not generally as well equipped in proportion to the demands made upon them as are the laboratories devoted to the other sciences.

An analysis of the statistics presented in the recent annual report of the State Superintendent of Public Instruction in Missouri shows that twenty-eight out of fifty-three high schools in the State with an enrollment of over one hundred pupils offer work in physical geography and agriculture. The estimated total value of the equipment for science work in these fifty-three schools is a little over sixty-three thousand dollars, and in the schools reporting work in physical geography and agriculture the value of the equipment for all the sciences is approximately thirty-two thousand dollars. The total value of the geographical apparatus in the twenty-eight schools is $3,345, or less than 10 per cent. of the value of all apparatus. Of this total $2,550 is concentrated in eight schools.

Thus proportionately geography is worse equipped than any other science, in spite of the fact that agriculture is taught in association with the geography and that the teaching of agriculture is strongly urged as a very valuable subject for rural high schools.

The condition in Missouri summarized above may not be indicative of conditions in the country at large, but it is at least suggestive and shows that more attention should be given to the material side of geography teaching. Physical geography from text-books is better than none, but the best physical geography teaching must be based on realities out of doors or on the indoor representation of out of doors realities.

REVIEW

BASIS OF AMERICAN HISTORY—1500-1900[1]

PROFESSOR FARRAND'S volume on the Basis of American History is volume two in the twenty-eight volume series now being published by Harper & Brothers under the title of "The American Nation—A History." The first five volumes in this series are devoted to the "Foundations of the Nation" and are known as Group 1 of the series. The volumes of Group 1 may be secured together, but as at present planned no single volume can be secured separately.

Professor Farrand well says in his preface that trustworthy and available volumes exist dealing with the physical features and the animal and plant life of the American continent, but that there is no satisfactory volume devoted to the aborigines and their life and customs. This is his reasonable excuse for devoting a relatively small space to the physical and life environment of the American Indian. In the introductory chapters he treats the general physiography, the routes of travel, the timber and agricultural products and the animal life of 1500. In each chapter those points are emphasized which were of importance in determining the distribution of the aborigines, their manner of life, their customs and beliefs. These chapters give an excellent setting for the later chapters devoted to the different groups of Indians and to certain general summaries in reference to Indian customs, warfare and religion.

The chapter on the classification and distribution of the American Indians is especially helpful for reference and is accompanied by two maps showing the distribution of the Indian groups in 1500 and 1900.

In each chapter the author considers the social life of the Indians as well as their physical characteristics. As one reads the descriptions he feels that the author understands the Indian as a man and does not look upon him merely as an interesting specimen for physical and mental measurements. One also feels that the author speaks with authority and that he knows his subject in all its interrelations—as he does.

The book is written simply and clearly and is largely free from technical details and nomenclatures. Hence the volume is very readable for those who are not students of anthropology. The book concludes with an excellent appendix, giving annotated references to the available literature, and contains an excellent index. It covers the ground as no other book does and should be read by every student of American history and geography. The volume should be accessible in every normal school library. R. E. D.

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[1] By Livigston Farrand. Pp. xviii + 301. New York, Harper & Brothers, 1904.

RECENT PUBLICATIONS

A. L. A. CATALOG—8,000 volumes for a Popular Library, with notes, edited by Melvil Dewey. Government Printing House, Washington, D. C.

The lists published in this catalogue represent the combined recommendations of a large body of critics selected from among librarians and experts in the different fields of thought. The list includes under history a large group of books devoted to general and regional geography. The entries under physical geography are meager and unsatisfactory. Arranged by subjects and by authors and very helpful for reference by teachers.

THE WORLD ALMANAC AND ENCYCLOPEDIA, 1905. Published by the New York World, 1905.

The latest volume of this indispensable handbook, like its predecessors, contains a vast amount of useful geographic information in a small compass. Accurate and usable.

EARLY WESTERN TRAVELS, 1748-1846. Edited by Reuben Gold Thwaites. Cleveland, Ohio, The Arthur H. Clark Company, 1904.

Vol. VI. Brackenridge's Journal of the Missouri, 1811: Franchère's Voyage to the Northwestern Coast, 1811-1814. pp. 410.

Brackenridge's Journal is an extremely interesting account of the Missouri country immediately after it was first explored by Lewis and Clark. Gives an excellent account of Indian life and of the ways of the buffalo.

Franchère's Voyage gives a very full and valuable account of conditions in the Columbia River country just after its first discovery. Descriptions of the social life of the Indians are very interesting. Well written, smooth and inviting reading.

Vol. VIII. Voyages, Travels and Discoveries by Tilly Buttrick, jr.; A Pedestrious Tour, of Four Thousand Miles, through the Western States and Territories, during the Winter and Spring of 1818. Estwick Evans, pp. 364.

Buttrick's account of his wanderings through the Middle West between 1812 and 1818 gives a very clear and simple account of frontier life, which forms an excellent basis for comparison with modern conditions. The difficulties of travel and the personal discomforts endured are graphically described. The constant danger from Indians and the success of the author in dealing with the Indians makes the text very spicy and interesting reading.

Evans describes how he traveled from New England through the Middle West and thence to New Orleans and the experiences he had by the way. Dressed in fur and accompanied by two faithful dogs, he lived a rough life, was frequently misunderstood, but came in close contact with people and gained a great variety of information which is graphically presented.

Vol. X. Hulme's Journal, 1818-1819; Flower's Letters, 1819 and 1820-1821; Wood's Two Years' Residence, 1820-1821.

The several journals combined in this volume deal largely with the earlier conditions of the prairie country. The life of the home and farm, the methods of travel and the general social conditions of the inhabitants are clearly and impartially portrayed. The sections devoted to the wild animals are especially interesting as showing the frontier conditions even where agriculture had been extensively developed.

CURRENT EVENTS

THE NEW SIMPLON TUNNEL

A LITTLE more than a hundred years ago Napoleon marched his great army of thirty thousand men over the Alps. It was wonderful military work, one of the famous achievements of war. By marvelous engineering, one of the famous achievements of peace, the new Simplon tunnel has just been bored under the Swiss Mountains. It is a more wonderful passage of the Alps than Napoleon's, and a hundredfold more beneficial to civilization.

The Simplon Pass always has been the great highway of travel from Switzerland into Italy. It was used by Cæsar and his legions as far back as 50 B. C., and although Napoleon happened to use the St. Bernard Pass, he recognized the superior importance of the Simplon, and ordered a military road to be built over it, to serve in future campaigns. It was begun in 1800, but before it was completed, in 1806, the fortunes of the battlefield led the Emperor elsewhere, so he never saw it. While thus constructed for war, no army ever crossed it. Instead of furnishing a route for cannons, it became a peaceful medium for international commerce.

Tourists, especially Americans, are constant travelers over the Simplon. Its scenery is grander than on any of the other Alpine passes, and the drive over it affords a most agreeable way of reaching Italy from Switzerland, or vice versa. The road is forty miles long, running between Brigue and Domo d'Ossola. The diligence does it in nine hours, twice a day in the summer season. The fare is a little over $4. At an altitude of seven thousand feet, up in a region of glaciers, avalanches and storms, the dash over the pass on top of a six-horse coach is a thrilling experience that most tourists plan to include in their European itinerary.

There are some nine refuges along the route, situated at the most dangerous places. The highest of these, near the pass itself, is the Simplon Hospice, founded by Napoleon for the rescue of hard-pressed travelers. It is conducted in connection with that other famous hospice, the one on the St. Bernard Pass. A small group of Augustine monks remain there the year round, ministering to the wants of wayfarers. Their life for the eight or nine months of winter is one of great dreariness and privation. After about twelve years of service the severity of the climate so undermines their constitutions that they are obliged to descend, with broken health, to the valleys below. As at the Bernard monastery, tourists are lodged gratuitously at the Simplon, but it is expected that they will deposit in the chapel alms-box, before they depart, as much as they would have paid at a hotel.

It is probable that with the opening of the new railway, a large portion of the Swiss-Italian travel henceforth will go through the tunnel, instead of over the more hazardous pass-trip.

Two gangs of workmen began to bore the Simplon tunnel, the longest and most remarkable of the Alpine tunnels, in November, 1898. One gang began at the northern end, which is near Brieg, on the left bank of the Rhone; and the other gang began operations simultaneously at Iselle, on the other side of the Pennine Alps, in Italy. Twelve miles apart they started, and day and night and Sundays for five and a half years were slowly tunneling toward each other. It was a most difficult undertaking. There were layers of hard-rock formations, gneiss, gypsum and dolomite, where drilling was so slow that during the first three months of 1902, for instance, the work on the Italian end advanced only fifty feet. Other great obstacles to be overcome were the streams of underground water, and the high temperature that exists under mountain masses.

For almost six years was the labor going on, until finally one day last May, toward evening, the two gangs of workmen were so near together that they could hear each other's voices faintly. Bright and early the following morning, amid great excitement, the powerful hydraulic boring machines were set to work, and in an hour a gaping, jagged hole opened that showed dimly the electric lights glimmering in the cavern beyond. Another fall of rock, and the men who, twelve miles apart and five and a half years before, had started toward each other met face to face under the Alps. A perfect engineering achievement; the headings of the two holes came together dead opposite each other. If the tunnel had been worked from one side only it couldn't have been straighter. It was a great triumph, as the shouts of the workmen told at the time, and as every traveler who journeys through the tunnel in the future will realize.

When they were building the St. Gotthard tunnel in 1882, considered a wonderful creation in its day—the combined effort of Italy, Germany and Switzerland—the rate at which the temperature rose the farther they penetrated the mountains was an unforeseen circumstance that almost caused the abandonment of the project. Before they had gone a third of the distance the heat was so intense that more than half of the working force fell seriously ill. A large number of horses and mules succumbed from prostration, and many a laborer left the tunnel never to enter it again.

A similar problem was anticipated in regard to the Simplon tunnel, especially as the latter was three miles longer than the former, and one thousand five hundred feet deeper under the mountains; but it was solved happily by building two tunnels instead of one. These tunnels run parallel, fifty-six feet apart, and are connected every two hundred and twenty yards by cross shafts, which were hermetically sealed as fast as the next one ahead was made. Through one of the tunnels fresh air was driven by the ventilation operators stationed outside in the valley. Around the last cross shaft it went, near where the men were working, and back out through the other tunnel. All injurious gases thus were carried off, and a constant current of pure air supplied. The plan worked like a charm, despite the fact that at some points the temperature ran as high as one hundred and seven degrees. When these spots were struck the hours of work were shortened considerably, and the men on leaving the tunnel were made to take cold baths, so as not to be exposed at once to the cold Alpine air outside. When they went in again they took hot baths.

The tunnel cost over a million dollars a mile. The Swiss Government, taking into account the enormous difficulties that have been encountered and surmounted, recently extended the time for completion to April 30, 1905. The boring now is mostly done, but work on the roadbed, rails and running stock still has to be completed. The government also has given the Jura-Simplon company a supplementary credit, increasing the payment from fourteen to fifteen and a half millions.

Unlike the situation at the St. Gotthard, where great artificial landing places had to be erected, both ends of the Simplon tunnel are easy of access. The present Jura-Simplon Railway, coming from Geneva, stops within a short distance of the tunnel's northern gate, while on the Italian side the train from Domo d'Ossola may readily join the new Simplon line.

The first of the great Alpine tunnels was the Mont Cenis, through which the direct French and English travel reaches Italy. It is eight miles long, was fourteen years in the building, and was finished in 1870. The second was the St. Gotthard, the chief route between Germany and Austria and the Mediterranean countries. It is a trifle more than nine miles in length, took nine years to finish, and was opened in 1880. The Arlberg came next—six and a half miles long. After three and a half years' work, it was completed in 1883.

When, this year, the new Simplon is ready for business, the Alps will have been practically annihilated. No longer will they stand in the way of that immense volume of trade and travel that goes on between northern and southern Europe.—*The Sunday Magazine.*

MAY HAVE BEARING ON PANAMA CANAL

WASHINGTON, Feb. 24.—The State Department at Washington to-day received the following cablegram about the completion of the Simplon tunnel from Consul Washington, at Geneva: "Simplon pierced. News received with general rejoicing and firing of salutes."

The successful outcome of this engineering feat may have an important bearing upon the project of Chief Engineer Wallace of the Panama Canal, to make that waterway a sea level canal by driving a tunnel four miles long under a mountain to divert the surplus waters of the Chagres River.

THE STRUGGLE OVER CORN SHIPMENTS

The railroads that touch the great Trans-Mississippi corn belt are engaged in a warm contention as to the route by which corn destined for export to Europe shall be sent. Up to the present it has been the prevailing custom with shippers to send corn by the railroad routes that have terminals in Boston, New York, Philadelphia, and Baltimore. But now the railroads that run south to the gulf, through the Mississippi Valley, are offering lower rates to New Orleans and Galveston, and so are diverting the corn traffic from the Atlantic ports to the Gulf ports. The situation is a simple one. The mileage from the corn States to the Gulf is considerably less than to Atlantic ports. At the same time the water route from New Orleans and Galveston to Europe is considerably longer than from Boston or New York. But water transportation is now at such low rates that a longer sea journey scarcely enters the problem. The natural disadvantages affect the easternbound railroads, and it is problematical whether they will be able to hold their own against the southbound lines to the Gulf. The serious feature of the struggle is to the eastbound lines, which may lose a large share of their income; to the Atlantic ports in the decrease of their exports, and especially to Chicago, whose monster elevators have handled by far the major portion of the corn shipments. Incidentally, the Erie Canal would be affected unfavorably. It is a large-sized problem; but geography will settle it, since few have ever fought against geography and prevailed.

CORN GOSPEL TRAIN

Practical education is brought almost to the doors of the farmers of the Middle West. The success of the "Corn Gospel Train" last year, from which Professor P. G. Holden lectured to the Iowa corn growers on the proper methods of planting, has led the Missouri Pacific Railroad to send out an agricultural exhibit car to all the large towns along its lines, says *World's Work*. The car was equipped with literature and lecturers, as well as with an exhibit. The car was sent out for the purpose of teaching the farmers how to increase their crops. Circulars and handbills were sent to the farmers ahead announcing the time of the car's arrival. A crowd assembled at each stopping place of the car. The speakers were men acquainted with the resources and possibilities of the sections visited. Corn experts, for example, discussed all phases of corn growing with the Iowa farmers.

Most of the meetings were held in the car, but in some cases overflow meetings were held outside. One result of the trip was the planting of 300,000 fruit trees along the line of the railroad.

What has happened along the route of the Missouri Pacific Railroad will happen along the line of other roads, thus making for a wider and better education of the farmers who are unable to attend the State Agricultural College.—*Journal of Education.*

THE MONARCH GEYSER

Those who have visited Yellowstone Park can never forget the eruptions of "Old Faithful" and his numerous kindred. But it is said that, awe-inspiring as these are, they are nothing but pigmies compared with the geyser Waimangu, near Roturna, New Zealand. This is really a baby geyser, as it made its appearance only about two years ago. The crater is nearly half an acre in extent, and very deep. At the time of eruption this immense crater is completely filled with black mud, stones, and steam. So great is the explosive force that mud and stones are occasionally thrown to a height of 1,000 feet. New Zealand, in many respects, is "Nature's Wonderland," but Waimangu must be accounted as one of her greatest attractions.

NOTES

Eritrea's New Capital.—The Government offices of the Italian colony of Eritrea have long been centered at Massowa on the Red Sea. They are now to be removed to the high plateau of the hinterland on account of the very trying climatic conditions of Massowa. The Government has adopted the suggestion of Mr. Ferdinand Martini, Governor of the colony since 1897, to transfer the capital to Asmara, sixty miles in the interior and forty-two miles from Macatat, the present inland terminus of the railroad. In 1897, when the Italians first occupied Asmara, it contained only a few scores of huts and an Abyssinian fort. The town now has a population of 9,000, including about 1,000 Europeans, all Italians excepting a few Greeks and some Norwegian missionaries. It has some aspects of European towns, with a few superior dwellings, cafés, a theater, a casino, a hotel, a postoffice, and handsome public and private gardens. It is situated only a mile and a half from the edge of the plateau, is in the midst of splendid pastures, and around it flourish many varieties of trees and some European crops.

None of the typical tropical diseases has a foothold in Asmara, which is 7,800 feet above the sea, with a maximum temperature of 88 degrees F., and a minimum of about 14 degrees. The town is reached from the end of the railroad by a remarkable wagon road built by the Italians in 1900-01. The road is forty-two miles long, winds from terrace to terrace, through deep cuts and numerous tunnels, is wide enough for wagons to pass one another, and is rendered safe at its outer edge by a barrier of timbers.

Bull. Am. Geog. Soc., Jan. 1, 1905.

CURRENT ARTICLES ON COMMERCE AND INDUSTRY:—

January:—

Accidents: The Railroad's Death-roll, *World's Work.*

Agriculture, Vital Facts of, I., *Country Life in Am.*

Agriculture: "The Farmers of the U. S.", *Nat'l Geog. Mag.*

Asia: "Merchandising in the Orient," *Comm. Bull, and N. W. Trade,* Jan. 28.

Canals: "New Ways About the World," *World's Work.*

Chili Nitrates, *Bull. of Bureau of Am. Republics,* Dec.

China, Canals in, *Cons. Rep.* Dec.

Corn: "Wealth on the Cob" (Ill.), *Sat. Evening Post,* Jan. 7.

Dairy, How to Manage a Successful (Ill.), *Country Life in Am.*

Employment: "How to Secure Right Men," *System.*

Foods and Drinks, Adulterated, *Sat. Evening Post,* Jan. 14.

Furs, Imitation of Valuable Skins, *The Shoe Retailer,* Jan. 25.

Germany: "Government by Experts," *Cons. Rep.* Dec.

Harbor, The New York (Ill.), *Sci. Am.,* Jan. 7.

Honesty, Commercial, *The Mfr.,* Jan. 7.

Immigration, The Character of, Past and Present, *Nat'l Geog. Mag.*

Macaroni, The Manufacture of, (Ill.), *Sci. Am.,* Jan. 7.

Merchant Marine, *Sci. Am.,* Jan. 7.

Pawnbroking: "At the Sale of the Unredeemed" (Ill.), *Century.*

Pittsburg, Symposium, *Rev. of Revs.*

Power: "A Practical Wave-Motor" (Ill.), *World-ToDay.*

Prune, and its Cultivation (Ill.), *Sci. Am.,* Jan. 7.

Retail Trade: "Mr. Bland, The Grocer," *Ladies' Home Journal.*

Russia, The Leather Industry of, *Hide and Leather,* Jan. 28.

Silk Production, The World's, *Cons. Rep.,* Dec.

Welfare Work of the Colorado Fuel and Iron Co. (Ill.), *Business Man's Mag. and Bookkeeper.*

E. D. J.

THE JOURNAL OF GEOGRAPHY

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RESULTS TO BE EXPECTED FROM A SCHOOL COURSE IN GEOGRAPHY

BY RALPH S. TARR

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AS a result of geography study in the grades, a child should have gained a fair knowledge of the geography of his home region. That is, he should know something of its physiography, industries and life conditions, and the relations, if notable, between these. I know of a city, in the schools of which a study is made of the delta of the Mississippi, while no use is made of the delta on which the schools are situated. An opportunity is missed here, and I suspect similar opportunities are missed in many other places.

The child should have a general understanding of the relations between his home region and the great world—what the home region contributes to the world and what the world contributes to it, and why. He should know of some regions resembling his own in other parts of the world, and some that differ from it, with reasons.

No child should be allowed to escape from geography without knowing the shape of the earth and the relations of its parts. I do not mean that he should merely learn that "the earth is round like a ball or an orange," but that he should be master of a globe. In how many schools does use keep the dust off the globe? How common is it for children to know what part of South America is due south of New York City? Or whether Spain is nearer Cuba or Newfoundland? Or whether it would be nearer to send grain from Winnepeg via the St. Lawrence or Hudson Bay? Or what is the relative distance from London, New York and New Orleans to Cape St. Roque?

The direction of places from his own home should be clearly understood, and this could easily be taught by having children point toward places as they are learning about them. I know of the case of a man, a college professor, who while studying geography sat at a desk which caused him to face the West. With the map having its northern edge toward the West, he learned directions just 90° out of the way, and to this day, when thinking of directions he has first to apply the correction of the 90° error which during his youth became so grounded in his mind.

The child should have a comprehensive knowledge of his own country, its main physical features, its climate, its life conditions, its leading industries, and such relations between these as can be clearly shown to children.

The names and locations of the states and leading cities, the child should know and should not be allowed to forget until after finishing the study of geography in the schools. This knowledge should be so clearly defined in the child's mind that he could sketch a map of the country, the state boundaries, and the location of the leading cities from memory—not a finished drawing with all the crooks of the state boundaries, but a general sketch map.

I believe the child should have the same kind of knowledge regarding other countries or continents, knowing the main physical features, the climate, the leading industries, and the relations between these. In addition he should know something about the people—their characteristics, and mode of life, especially with relation to its resemblance to or difference from our own.

It should be possible for each child to draw an outline map of each of the continents, and to sketch in the boundaries of the countries, and locate the leading cities. He should know something about these cities besides their mere location, and if there is a relation of importance between location and the surroundings, this relation should be known. In a continent sketch the main seas, gulfs, peninsulas and islands should be named.

There is such a close relation between climate and industry that a child should appreciate the main facts regarding world climate, and understand its influence on industries and people; and this knowledge should be made specific by application in instances where the influence is clear and unmistakable.

Children should be so taught that geography becomes instructive and even fascinating, thus leading them to further study after school days are over. As it is now far too many pupils go through geography as a hateful grind, giving up thanks when it is ended. One way to accomplish the end of making geography attractive is to show its relation to other things, such as history, travel, newspaper reading, etc. Let the child see that geography knowledge is related to life work and teach him some of the relations.

There are doubtless other facts and relations which a child could well be expected to carry away from a rational and well-conducted course in geography, but these that I have mentioned I believe to be the most fundamentally important. They will equip a child for later education along geographic lines, an education that in most instances comes from reading and travel. Geography education merely begins in the schools, and it is important to make the beginning a good one and sufficiently attractive to add zest to further education.

There are some things which I think a child should *not* carry away from a study of geography, and if I were to make a list of them I should place first in the list the little tidbits served up in some of the supplementary readers of the "dear little children" class. Life is too short, and school life ought to be too serious for that sort of thing. It would be better to revert to the old-fashioned method of learning all the capes and all the capitals, for that at least trains the memory.

Besides supplying a stock of information, geography study ought to train the child's mind, and lead him to adopt certain mental habits. In this training, that of memorizing should have a conspicuous place. It has become a habit, in some quarters amounting even to a fad, to consider the mere training of the memory of little educational value. I suspect that this is in imitation of the university where reasoning and individual thinking have higher rank than mere memorizing; but university students need first of all to have a memory, and training toward this end must come early in life. I believe that no mental quality, aside from qualities of morality, is of more fundamental importance than that of memory, and no mind is better equipped than that with strong memory combined with good reasoning power. Geography properly taught provides opportunity for training both the memory and the reasoning power; and it should in all cases be made to contribute toward thus equipping the scholar. The old-fashioned teacher who required the learning of lists of names was not altogether wrong, and the new-fashioned teacher may well imitate his old-fashioned teacher to some extent.

One result of geography study should be the acquisition of the habit of inquiry. Where is this place? Why is this thing so? What is there in that section? And coupled with the habit of inquiry should be an unwillingness to accept explanations that are not clear and convincing. Rid the pupil of the belief in the infallibility of books and teachers and encourage him to think for himself, if only a very little.

Another result of geography study should be the learning of the *atlas habit.* To know how to use an atlas and to know that, in its way, the using of an atlas is as valuable as using a dictionary, is to learn a lesson of great value in preparation for life work. It is true that many of the scholars may grow up without need or opportunity for the use of an atlas; but many others will have the opportunity and, if acquainted with the value of the atlas, will find the need of using it. They should have the lesson.

In a similar way geography study offers opportunity to learn how to make use of other books, including the encyclopedias; but the mistake should not be made of teaching the scholars that they are "going to first sources," as I have heard very good teachers call this sort of "research."

The use of the text book in geography, and of reference books should also teach the use of an index. How often have I seen college students looking for something in a book by turning over page after page, when by turning to the index the topic could be found in a minute. It is the business of the schools to teach scholars how to avoid such wastes of time.

These are some of the direct and indirect effects of geography study which I should expect a child to carry away from a well-taught course in geography in the grades. I know of schools where all these results, and more, are obtained; but I know of far more schools where only a meager fraction of them is attained. It would be a great boon to geography teaching if there could be a general agreement upon the question, "What should the child gain from his geography course?" and some uniformity of agreement as to the best means of teaching the subject so as to insure his gaining it.

RUSSIA COMPARED WITH AMERICA

Russia is two and one-half times as large as the United States and Alaska, but America has fifty-three times as many miles of telegraph and sends fifteen times as much mail.

Russia stands next to the United States as a grain producing country, but the average laborer there gets only one-fourth as much wages as in the United States.

The United States has twenty-three times as many factories as Russia.

Russia produces one-twentieth as much coal and one-sixth as much iron as is produced in the United States.

In Russia there are only ninety daily newspapers; in the United States there are 2,457.

Russia has 30,000 miles of coast line, but half of it is ice-bound.

The United States has 210,000 miles of railways; Russia has only 36,000 miles of railways, two-thirds of it owned by the government.

Russia's population in 1903 was 141,000,000; population of the United States, 80,000,000.—*American Education, March, 1905.*

RESULTS TO BE EXPECTED FROM A SCHOOL COURSE IN GEOGRAPHY

BY R. H. WHITBECK
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THIS is the age of the enriched grammar school curriculum. Geography shares the boy's time with one or two dozen other studies. Serious study of the subject begins in the fourth or fifth school year, and ends in the seventh or eighth. There is a difference between the ideal—or what we should like to have the boy know of geography—and the attainable ideal—or what we may reasonably expect him to know. There is, too, quite a margin between what a boy may be expected to know at the end of the grammar school course and the sum of all that he has known, at one time and another, during that course. Of all the details he has learned in daily lessons he retains, perhaps, one-fifth throughout the eighth year. I suspect that even this fraction is too large. Nor is it unfortunate that he has forgotten so much. The value of much that he learned lies in having learned it, not in knowing it for all time.

Again, acquiring information is only a part, though a goodly part, of the aim in studying geography. This study coöperates with the others in building up mind-power, broadening interests, and cultivating judgment. Of all the studies in the elementary curriculum, geography most readily lends itself to the cultivation of cause-and-effect judgments. The "causal notion" may be carried too far in geography; we may call upon the pupil to reason more maturely than his youthfulness permits; yet, by almost daily observation of grammar school classes at work, I am convinced of the splendid field that geography offers for cultivating the power to reason from cause to consequence.

For convenience of treatment, I have divided the discussion that follows under six heads:

Home Geography.
The World as a Whole.
Knowledge of Location.
Facts of Physical Geography.
Facts of Commercial Geography.
General Facts.

Home Geography.—This information will not all be acquired in the early years of geography study. It will be gained little by little throughout the whole course.

The boy should acquire a first-hand knowledge of the surface features of the home region; of the natural products of the region; of the chief lines of manufacture in his own city or town.

He should gain something of an appreciation of how the different lines of manufacturing are influenced by the natural productions of the region; by the nearness of markets that demand certain articles; by the presence of water power, or the nearness of fuel supplies; by facilities for transportation, and how all these are influenced by physiography.

He should know whence local manufacturers obtain their raw materials; where they sell most of their out-put; and something of the reasons why the materials are bought and the goods sold where they are bought or sold; what advantages of situation his city possesses for carrying on special or general manufacturing; and what other cities are its chief competitors.

He should understand the reasons which lead to the exchange of commodities between the city and the country, between his city and other parts of the country, and between his country and other lands.

He should see the need of stores, wholesale and retail, of banks, of paved streets, of city government (if he lives in a city), of good roads leading through the country, of railroads, steamship lines, telegraph and telephone lines. In short he should acquire a considerable first-hand knowledge which will lead to an appreciation of the simpler causes that influenced the development of his own city in industries and commerce.

Home geography should be largely observational geography, from which, under the teacher's guidance, deductions are made and generalizations reached. The wisely conducted field trip is the richest geography lesson in the world. We have only begun to appreciate the value of this sort of geography. Says Karl Ritter: "Wherever home is, there lie all the materials which are needed for the study of the entire Globe."

Probably the geography of one's own state may not properly be termed home geography. Yet, just as a close study of one's city as a type gives an apperceptive basis for interpreting much that follows in geography, so the close study of one's own state in the light of "cause and consequence" makes far more real the general principles that the boy ought to know.[1]

The World as a Whole.—The boy ought to know with accuracy the meaning of the terms that are frequently used in geography: latitude, longitude, equator, axis, horizon, orbit, etc.; isthmus, peninsula, plateau, strait, etc.

He ought to know (in round numbers) the earth's dimensions; the amount of the inclination of its axis, and the effect of this in fixing the width of the light zones, in causing the change of the seasons, in causing variations in length of day and night.

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[1] The details of such a study as this were given in the October Journal of Geography.

He should know why the slanting rays of the sun heat the earth less than the direct rays and how this affects climate, and thus affects the conditions of life all over the earth.

He should know the causes for the length of our day, our month, and our year; the relation of longitude to time; the time belts in the United States.

He ought to know the relative sizes of the grand divisions of land, their grouping, the oceans and their larger arms that border each of the continents.

He ought to know something of the distances, both in time units and space units between, say, Liverpool and New York, San Francisco and Japan, San Francisco and New York by the Cape Horn route, the Panama route, and the overland route.

He ought to have some idea of the *relative* areas and populations of the leading nations of the world (their colonies not included); for example, he should know how Germany compares with France, the British Isles, Russia, and the United States in area and population.

He ought to have a reasonably correct notion of distances in the United States, and of the relative sizes and populations of typical states, using his own state as a unit of comparison.

He should know the simpler facts about atmospheric movements and their causes and results; about trade winds, calms, prevailing westerlies, and especially how these affect climate, navigation, and ocean currents.

He ought to know the simpler facts about oceanic movements; the three or four most pronounced "currents"; their relation to the prevailing winds and their climatic influence. The nature and periodicity of the tides, their connection with the moon, and their effect on navigation should be known. A thorough discussion of the causes of the tides is out of place in elementary geography.

He ought to have a reasonably correct notion of the latitude of important foreign countries and cities as compared with parts of the United States: to know, for example, that St. Petersburg has the same latitude as Southern Greenland. Such inquiries will lead to a knowledge of oceanic and continental climates, and the difference in climate between east-facing and west-facing coasts.

Knowledge of Location.—Given an unlettered map of the United States, on which the states are outlined, our grammar school graduate ought to be able to write the names of the states in their proper places. He ought to be able to do as much for the important divisions of South America, Europe, Asia, and Africa.

He should know the approximate location of the eight or ten best known rivers of the Atlantic Slope of North America; the six or eight main rivers of the Mississippi system; three or four of the Pacific Slope rivers, and two or three of Canada; the three great river systems of South America; four or five of Africa, a half dozen of Asia, two or three of the British Isles, of France, of Germany, and of Russia; also the Po and the Danube. He should, of course, know the rivers of the region in which he lives.

He should know the location of such arms of the ocean as are highways of the world's great commercial movements.

He should know the location of those islands and groups of islands that are real factors in the world's activities, or have a general historical interest.

He should know the facts of position, direction of trend, etc., of the half dozen most important mountain systems or mountain groups of North America; the Andes, Alps, Pyrenees, Apennines, Caucasus, Ural, Himalaya and Altai; the location of a few of the most frequently mentioned peaks; such, for example, as Mt. Blanc and Mt. Everest.

There are a few capes that are often mentioned, such as Horn, and Good Hope, and their location is worth knowing.

He ought to know something of the location of the *chief* colonies of Great Britain, France, Germany, Holland, and the United States.

He ought to know accurately the location of some twenty-five of the chief cities of the United States; what those cities stand for in our industrial and commercial life, and the advantages of their situation. There are twenty-five or thirty foreign cities whose location should be definitely known, and also something of what those cities stand for. In addition to these, there are fifty or more other cities at home and abroad whose names ought to be familiar to the pupil. It is sufficient to know merely in what state or nation these are located.

Facts of Physical Geography.—Émile should know why the rocks decay, how soil is made, how the agents of waste work, how streams carve their valleys, and make flood plains and deltas, and carry waste to the sea.

He should know the characteristics of old valleys, and of young valleys, and the influence of each upon human affairs.

He should know why there are lakes and waterfalls in stream courses, and the effect of these upon human well-being.

He should know in a simple way how the earth's crust is made, how it has wrinkled into mountain folds and valleys, how the strong rocks have resisted the agents of waste, and the weak rocks have yielded—the former standing up as highlands, and the latter being reduced to valleys.

He should understand that rising and sinking of the land is going on, and that along the coast this results either in a sandy plain bordered by a shallow sea, or in a coast with drowned river mouths and good harbors.

He should have some knowledge of such topics as underground water and caverns, of geysers, volcanoes, earthquakes, and glaciers. If he lives in a glaciated region, he should know how the glacier removed and deposited soil, transported boulders, scoured out valleys, ponded streams into lakes, caused waterfalls, and made terminal and ground moraines.

He should understand the chief factors that determine the climate of a region, with emphasis upon the climate of his home. Systematic weather observations ought to be made and their meaning interpreted.

He should know the meaning and significance of isotherms, and the difference between heat zones and light zones.

In his study of the facts of physical geography, he should have considered constantly their relation to human affairs.

Facts of Commercial Geography.—Many of the fundamental principles of commercial geography may be studied at first hand in the home city and surrounding region. Reference is made to some of these under "Home Geography."

Our boy should know, in considerable detail, a few of the great lines of industry in the United States. These should be treated on the plan of Dr. McMurry's Type Studies. Such studies might be:

(*a*) Flour—from the sowing of the wheat to the delivery of the flour to the consumer.

(*b*) Steel—from the Lake Superior iron mines to finished steels rails.

(*c*) Beef—from ranch to retail market.

(*d*) Cotton—from plantation to loom.

He should know the main geographical condition or conditions that favor the production of the world's great staples of commerce: tea, coffee, sugar, grains, silk, spices, cotton, fruits, wool, etc. Climate and soil conditions are, of course, the leading factors.

He should know something of the distribution of the richest mineral regions of the world, and the influence of these deposits upon the industrial development of the countries where they are found. Such, for example, are the gold and diamonds of South Africa; the gold of Australia, California, and the Klondike; the iron and coal of Germany, the British Isles, and different sections of our own country.

He should know our four or five chief imports from South and Central

America, one, two or three each from the chief countries of Europe, from Mexico, Canada, West Indies, East Indies, Japan, China, and a few other countries. Beware of long lists of imports and exports.

He should know the nature of our trade with Great Britain, Germany, and France; why, as a rule, food products are going in one direction, and manufactures in the other.

He should have gained, by frequent repetition, an appreciation of the importance of transportation lines; of access to great markets, to fuel, and to raw materials; and the value of good harbors and navigable inland waters.

He should know by what railroad lines he would probably travel in going from his home to a few of the great cities of the country.

He should know the four or five chief seaports of Europe that have regular and frequent steamer connection with New York and Philadelphia.

General Facts.—While details about government and religion are out of place in geography, yet the pupil should know under what forms of government and religion the leading nations or races live.

He should know the capitals of the important nations. I do not believe he need learn the capitals of all of our states.

He ought to have studied enough field geography to have an intelligent interest in recognizing the geographical features that he sees in a railway journey.

He ought to have acquired an interest in world's peoples, places, and happenings, that will qualify him to enjoy reading about them after he leaves school.

He should have studied maps, and sketched maps, to the end that, when reading about any part of the world, he can picture the map of that country in his mind.

He should have acquired, little by little, an elementary realization of the meaning of "geographic control" and "geographic response," and some knowledge of the relation of geography to history. He should have learned the use of atlas, encyclopedia, and other standard reference books.

THE SCHOOL OF GEOGRAPHY AT THE UNIVERSITY OF OXFORD

The report for 1904 of the School of Geography at the University of Oxford, shows that the school is growing rapidly in strength and efficiency. The average attendance for the three terms was 133, including one student each from the United States, France, Germany, Italy and Egypt. The larger part of the work was devoted to the History of Geography and to Regional Geography.

RESULTS TO BE EXPECTED FROM A SCHOOL COURSE IN GEOGRAPHY

BY MARTHA KRUG GENTHE
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"I do not see how we can avoid the conclusion that if efficiency in teaching can be determined at all it must be determined by the results achieved."—*J. M. Rice.*

THE merits of the teaching of geography, as well as of any other branch of teaching, must be judged by their results. The results of all teaching may be summed up under the two questions: How much knowledge has the child derived therefrom? and: How much mental power has it given him? ? Both power and knowledge contribute to produce independence of thought. A teacher who gives his pupils only knowledge, however accurate it may be, will fail to make them mentally independent, because they will not know how to use it. A teacher who trains only the reasoning power of the child without equipping him with a liberal supply of positive information, will also fail in this respect, because the child will depend on others for the material on which to apply his finely developed intellect. This is especially true of a science so full of positive facts as geography. Setting aside, therefore, these aspects of the teaching which work toward creating power, and taking the general necessity of its acquisition for granted, it seems well worth while to take up a separate discussion of what a child ought to *know* in geography at the end of his school course.

Geography is earth-lore; but such are, in a different sense, geology, and botany, and zoology, and physics, and chemistry—each one of the natural sciences tells a chapter of the story of our planet. Geography deals with that chapter of earth-lore which tells what important part the problem of location has played in this story which unveils both the causes and the consequences of location. If, for reasons of convenience, the store of geographical information is divided into a physico-geographical and a bio-geographical half, this ought not to lead to a method of teaching which fills one corner of the child's memory with physiographic, and another with "ontographic," facts. *Geography is that part of earth lore which explains the causes and consequences of location.* What is located together in nature, must not be located separately in the mind. Therefore, as far as the question of positive knowledge is concerned, the child who has completed a good course in public school geography must associate every name which it has learned in the course with a fairly definite place on the map and with a general knowledge of the main features of that place which constitute its environment.

Such an association requires:

1. An elementary knowledge of mathematical geography. Longitude and latitude remain at the bottom of every geographical problem. Their explanation requires a knowledge of the shape, size, and motions of the earth, and through these of climatic and atmospheric conditions as well as of the main features of the sky: pole star, zodiac, and as a little refreshing supplement, the acquaintance with the principal stars and planets: the earth itself being one of those places whose location and environment ought to be fairly well known.

2. The knowledge of the shape, size, and relative position of the continents and oceans. It is the distribution of these large units of geography which has indicated the primary lines for the distribution of man, animal, and plant. The late entrance of South America, South Africa, and Australia on the stage of the world's history as compared with Asia, Europe, and North America can never be better understood than in view of the waste of waters toward which their tapering outlines point and which renders communication, that powerful stimulus of development, practically impossible under primitive conditions. One of the greatest faults of current school maps is that they deprive the children, out of misplaced economy, of the picture of the region south of the 30th parallel. "There is nothing there" is the excuse. On the contrary, this very Nothing is what we need on the maps, the bleak, bare nothing of the southern cap of the earth which has in all ages been the barrier of progress, and whose inhospitable realm even nineteenth century enterprise has not conquered.

3. The knowledge of the main topographic features of the continents and of the currents of the oceans as developers, or retarders, of progress. Why is Russia the only European country whose size approaches that of the United States? Why, however, is not a single Russian river, whether in Europe or in Asia, equal to the Mississippi, or even the Hudson, in commercial value? The location of the topographic features explains such problems.

4. An acquaintance with the countries of the earth as geographical units. Even among the states of this country, whose boundaries are to a great extent artificial and devoid of any geographic foundation, we have come to discern groups of states which compose natural units. To a much larger extent do the natural and the political groups correspond in the countries of the old world where during the slow development of earlier ages the natural barriers of man's expansion were almost insurmountable and where therefore the political territories had to adapt themselves more or less closely to the geographical conditions. The story of the old countries in

Asia, Europe, and Africa, is the story of rivers, mountains, and valleys. Their original boundaries were not laid by the official surveyor; they have a history just as much as the river has one, and the whole geography of the old world and partially even that of the new, can be demonstrated by the story of how man took possession of the soil. Therefore a deeper understanding of the present geographic conditions of the old countries cannot be secured without some knowledge of the fundamental phases of their development, and for this reason a short abstract of their history ought to be required as an essential part of the geography of the more important countries of the world.

Taking Germany, for example, the first problem of location, the ascertaining of latitude and longitude, would be found in the numbers 48-56 N. and 6-23 E. What does that mean? First, that it lies in the temperate zone, *e. g.*, in the zone which has given birth to the most civilized and progressive nations; secondly, that it lies on the eastern hemisphere, viz.: belongs to the old countries. This means that its institutions are superior to other countries in regard to stability and maturity, and inferior in regard to elasticity, and adaptability to new conditions. It means a densely populated country, a strong and continuous emigration of the surplus population. It means traditions and legends, and crumbling towers. It means the product of all the civilizations combined which, from the days of Julius Caesar, have flourished on its soil.

The second problem is its location within the continent. We find Europe between 77 and 35 N. and 10 W. and 65 E. This means, first: that almost all countries of Europe are in the temperate zone, and that therefore Germany must always have met with the competition of other progressive and civilized countries; secondly, that this competition must have had a beneficial influence as a stimulant to its own progress: thirdly, that through its central position among such active neighbors, it is more likely to get into trouble, either by war or by commercial rivalry, than any other nation; fourthly, that only by constant watchfulness in war and peace can it hope to avoid being crushed between its competing neighbors.

The third problem would be its location with regard to the oceans and waterways. We find that it has no direct access to the ocean highways, and should expect it to hold no high rank among the seafaring nations. Yet we find large seaports, and the consular reports tell us that it is one of the leading nations in commerce and shipping. Why? Because it is an old country, viz.: its navigation was started at a time when ocean highways were no part of the world's trade routes, and by the time that transoceanic travel developed, the spirit of enterprise, stimulated by competition and aided by an old civilization, found means to adapt itself to the changed conditions.

The fourth problem would be the location of its mountains. Where are the mountains, and where the plains, in Germany? We find the mountains mainly in the south, the level country mainly in the north. What is the consequence? A striking uniformity of the climate from north to south, the higher altitude of the latter being counterbalanced by its southerly location. We also find that the eastern parts of the country include more lowland than the western parts, and that they connect with the large Russian lowland. Consequence: the east is under the influence of the continental climate of Russia, while the west has the even climate of the Atlantic regions. Thus, the differences of climate in Germany are found between the east and west rather than between the north and south.

How is the distribution of the ranges within the mountainous area? Some trend NE.-SW., others SE.-NW. What is the consequence? A dissection of the country by the mountains into small provinces which, in an old country settled long before means of quick locomotion were available, lead to a splitting up of the nation into numerous small tribes under separate chiefs of which the present political map of Germany still bears striking evidence.

The fifth problem: location of the rivers. All the space in which the rivers can develop is included between the Alps and the ocean. Consequence: short rivers, each of them smaller than any of the important navigable rivers of America. We should expect almost no navigation. We find plenty of it. Why? Because the country is an old country, and therefore its navigation started at a time when only small craft and small distances entered into consideration. In proportion as trade grew, these limited possibilities were gradually developed to their utmost capacity, and by dredging, regulating, and deepening the channels even these wretched watercourses were made to satisfy the demands of a trade which much larger rivers in the new countries are unable to supply.

Sixth, the location of the cities: Where are, for instance, Hamburg, Bremen, and the other leading seaports situated? Not at the mouths of the respective rivers, as New York and other American ports, but several miles inland, viz.: at the head of the tide water line, so that large steamers cannot go up the shallow river and must be unloaded before reaching the city. Why? Because at the time when those ports were founded, rivers were the only ways of inland transportation, ocean vessels were smaller and therefore the harbor was built at the farthest inland point which vessels could reach, so as to shorten as far as possible the expense of land transportation.

In new countries where the development of commerce set in almost with the use of steam transportation, the slow waterway was shortened as much as possible, and the goods taken from the steamers as soon as they came within reach of the railroad.

These are only a few of the hundreds of possibilities which the scientific study of geographical location offers. They suffice to show how well the physical and the human aspects of geography can be blended so that the student gets a *complete* and *homogeneous* idea of the countries of the world and their share in its life and work. As far as the explanation of pure physical and geological subjects helps to explain the interdependence of the various problems, their knowledge must be demanded of the pupil; but on the whole, geography is neither physics nor geology, and both teachers and pupils ought to be spared a great amount of work whose proper place is not in the geography lesson, but in natural history. If it makes a pupil's impression of the Rhine valley more vivid to know that the rivers there dissect an old peneplain, well and good; but if it takes up the time which ought to be spent in making the pupil see that Berlin is not situated on the Rhine—an opinion quite frequent even among college students—he is missing some knowledge much more important for an understanding of Germany from the geographical point of view than the other fact can ever give him.

Under such treatment, map study, not book study, becomes the foundation of geography teaching; this adds a fundamental requirement to the knowledge derived from school geography: ability to read a map, from the simple relief map of the elementary course to the sheets of the state survey. If then, upon completion of the course, the pupil is able to find his way on the globe, directed by the knowledge of where the places are, influenced in his choice by a correct idea of their relative importance, and guided by the best productions of cartographic art, it may well be said that he knows all he ought to know in geography at the end of his school course.

MEMORIZING IN SCHOOL GEOGRAPHY

Do not have pupils memorize any boundaries of states or countries, except a few of importance. Pupils should, however, know from the formation of mental pictures the location of the states and countries.

Very little attention should be given to memorizing the length of rivers, height of mountains, size of cities, etc. Those of the Amazon and the Mississippi, of two mountains in North America, one in South America, one in Asia, the population of New York, Boston, Chicago, London, Paris, and of course the population of Indiana, of Indianapolis, and of the United States, will perhaps suffice.—*Indianapolis Course of Study.*

RESULTS TO BE EXPECTED FROM A SCHOOL COURSE IN GEOGRAPHY*

BY MARK S. W. JEFFERSON

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THE first practical question seems to me to be, What is the object of geography in the grades? What result do we desire to attain? What is the nature of the geographic facts and principles that should be imparted in the first eight years of school?

Incidentally we must inquire whether the attainment of these facts of knowledge is to come through mere memory drill, or whether there may be an association of allied facts, a comparison of things and relations that shall contribute to mental growth and culture.

The inquiry is a very wide one, and therein difficult. It might be thought that the common part in our recent text-books is surely what we hope to teach the pupils. On the other hand, I am of opinion that we can examine a text-book profitably only when we have some sort of criterion in mind as to what ought to be included in a public school course. Public school instruction in any subject can only succeed when it knows definitely the objects aimed at, and seeks the most efficient means for their attainment. What, then, is the knowledge, what the power that the geography class should put in the hands of the pupil who enters the high school?

High in importance stand, I think, the thought of the earth as a ball, an acquaintance with the continents and oceans and certain physical features, so dominant as to intimately affect the destinies of wide areas of the earth and its population. In details here are opportunities for wide divergences of opinion, yet I suppose that after oceans and continents, the Rocky Mountains, the Andes, the Alps, and the Himalayas, should be known to every citizen, as also the Mississippi, the Nile, the Amazon, the Rhine and the Danube. It seems to me as disgraceful to be twenty years of age and think the Amazon is in Africa, as to misspell words of one syllable. There are other rivers and mountains innumerable, that I would require no one to learn. Now, this acquaintance with the general earth features will find its value as a basis for acquaintance with our own country and a certain group of other countries that make our own intelligible by comparison and contrast, just as we always get a valuable gain in the use of our own mother tongue when we learn any foreign language.

Among such countries I may name England, France, Germany, Russia,

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India, China, Japan, Brazil, Argentine, and Chile, without being exigent. Not that no others should be taught, but surely these should be required of all. To set out a list of such countries for all teachers and all schools would not be profitable. I think no such list can be prepared. I would rather say such countries as these are surely too important not to be learned; while others, like perhaps Baluchistan and the German colonies in Africa need not ever be inflicted on the children in America. Some countries are so paramount by their civilization, their history and their commercial relations, that we must become somewhat familiar with them. On the nature of our knowledge, our familiarity with the greater countries of the earth, I should like to lay some emphasis. While we may be content with far fewer details of geographic knowledge than in the past, the extent and completeness of our knowledge of the countries studied, should be greater than it has been. There is need of great change here. To know England should mean to have live, vivid ideas of what England is, what her landscapes, what her shores, what her people, her cities, her villages, and above all, how she lives and what she stands for. How in English history is to be found that idea of representative government which was the germ of our form of government, and has served Europe in the present century as the model on which she has shaped her moderate infusion of constitutionalism.

To know Germany should mean to have some image in the mind of German landscapes and German life and industry, and above all to have a notion of what German patience and thoroughness mean to modern science, and how Germany owes her modern place in the world as distinctly to the strength of union—one great state from many little ones—even as our American republic. To know the Germany of to-day, one needs must know something of Bismarck, something of the rise of Prussia.

So in studying France we must not allow the pupil to be ignorant of that French pre-eminence in matters of taste that impresses itself on French relations with all the world.

And with Russia, shall we fail to point out her great likeness to our material domain in many physical and climatic conditions, as in great staple products and thin population, while her overpowering advantage of nearness to the European and Asiatic markets is thrown away by a governmental system that is Russia's handicap and America's opportunity. What country bounds Russia on the southwest? It is important for the student to know how to find out from an atlas, whenever he needs to know. It is not necessarily a thing to burden all American minds with, while the sort of facts that I have pointed out, the conception of Russia as our naturally endowed rival, the realization that the blessing of individual freedom that we enjoy is directly worth, not merely happiness and contentment, but great commercial advantages that we enjoy, not through our own merit, but by inheritance from the founders of our marvelous free government—these are things that the young should come to know.

A few countries, made real in landscape, life and institutions, and those the countries of greatest importance—that is my ideal of the geographic attainment in point of facts for the eight years of the grades.

Many countries ought not to be studied, but ability to look up any country in an atlas, must be taught and much practiced. This is a form of teaching we do not use enough in either the geography or history class. German educational theory on this point is emphatic that maps should not appear in the text-book of geography, since it tends to make the atlas seem superfluous. The German geography text does without maps. So do European geographies generally. The American idea of a small atlas included in the geography, has governed the very shape and size of our books for many years, but is now weakening before a general recognition that the map in the book should at least be very simple. Let us learn to send the pupils to the atlas every day. Let us go there ourselves incessantly. Such a habit, and a coincident use of the encyclopædia will take care of the vast mass of geographic facts.

As a criterion for selecting countries to be taught and countries to be neglected, I think we should look to essential relations with our own land, either in commerce, history, or civilization.

Much use of pictures; many of them, and studied in great detail; diligent inquiry and study by the teacher about every point brought up in the class; talks by the citizens on the things that impressed them on visits any of them have made to distant countries, a geographic material that exists neglected in almost every town; a sufficient amount of map drawing, on nets of actual parallels and meridians; these and similar means should make it possible to give good conceptions of our own country and some foreign lands, within the time allotted to geography in the grades.

The method, I should say, was to elicit ideas, and not teach words. In this respect we shall make a vast improvement if we will go out into the laboratory provided in the world of out-of-doors. All the world is made up of parts, and a vast number of these parts are exemplified in every neighborhood.

For the missing ones, a contrast suffices oftentimes as well as an analogy. This portion of my subject is difficult to express, for few of my readers are accustomed enough to the world of out-of-doors to know these geographic elements that make it up. Let us use a familiar illustration. Millions of people live on broad plains or deltas that the rivers have brought as sediments from the mountains and spread out at the borders of the sea. Thus the dwellers on the plains of Piedmont, in the basin of Hungary, or on the lowland of North Germany and Holland, live on lands thus built up by the Po, Danube and Rhine, with the materials they have obtained in the Alps in excavating the labyrinth of gorges and valleys that enhance the mountains' height and lend their effect thus to make them stand forth, loftier and more rugged and sublime to the æsthetic sense. Right here in Ypsilanti, are a thousand deltas built and building, from an inch to many acres square. Is it not well to take the children to them, to see them grow, to play upon them, to note their change with every rain, and look for others if we would have them understand those distant lands? Standing on a broad delta and looking back to the gully its materials have come from, can we not, perhaps, arouse a mental image of distant lands that will be a solid foundation upon which to build? Can we not evoke some semblance in the mind of a Ganges plain, leading back to Himalayan gorges? For how many thousand years have men noted the constellations changing with the seasons, the planet wanderings and varying attitude of sun and moon? Yet how many teachers actually have the class gather at noon, or sunset or sunrise (!) to note direction and length of shadow, even three or four times a year? Who takes an evening every month to point out the Dipper, Orion, and the Pole star, the phases of the moon and the actual wanderings of Jupiter, Venus, and Mars among the stars that do not wander? These are chances for positive delight for the children. Yet how many have grown up, unaware of these things as realities, knowing of their names only, and what books say of them, a deadly form of ignorance.

Out-of-door classes in every grade, much exploring of the fields by the teacher before she takes the class, some real knowledge of essentials for a few lands and a few peoples that matter much to us, with much reading, much seeking, much thinking, and the habit of incessantly referring to maps. These are some things that are important in geography in the grades. If programs say that field and sky work cannot be allowed for, in view of the uncertainty of the weather, it is possible that the programs are a bit stiff, and need limbering. If the essential importance of the work is recognized, the program will accommodate it.

THE TEXT, THE COURSE OF STUDY AND THE TEACHER*

BY R. D. CALKINS

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WHILE there has been a wonderful development of school geography, it has not been a symmetrical development. The text coming from skilled specialists reflects as much of this progress as it can under the conditions. In a measure it has lifted the teacher but it still dominates her and will continue to dominate her until she finds a source of information and a means of discipline in the subject that is higher and better than the text that her class is using. By the system of geographic inbreeding whereby high school and normal graduates often return to the grades as teachers with little, if any, better preparation for teaching geography than when they left the grades as pupils, not only are the errors and bad science of half a century ago perpetuated from generation to generation, but the teacher is robbed of all power of initiative and independent thought and made a slavish follower of the text, often with little if any improvement in her methods of teaching over that of her predecessors who thought the verbatim committing to memory of the text to be the acme of good teaching.

Occasionally a superintendent is spurred into temporary activity by the partial realization of these conditions and before the spell has passed, he may have gone so far as to have changed the text books or even to have ***compiled*** a course of study for the grades. Seldom does the fever of reform continue until he has penetrated to the geographic preparation of his teachers and has inaugurated a real reform by demanding from normal schools and colleges, teachers, who, along with the other courses which they have taken, have had enough geography to justify their attempting to teach it. Could such a superintendent, together with the other superintendents of the state, have been geography teachers in our normal schools and received into their classes for five or six years, the geographical output of the grades and high schools, I assure you the realization of conditions would be anything but partial, and they would be in a position not only to understand but to pardon any little pessimistic outcroppings which may appear in the midst of my usual optimism.

There are several reasons why every city and town should have its own carefully worked out course of study in geography. There are also several reasons which, for the present at least, will tend to prevent such a course from accomplishing the ends desired. It is quite essential that we consider briefly these various causes and reasons.

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* Part of a paper presented to the Michigan Teachers' Association, Dec. 1904.

As we have already intimated, the child's knowledge of geography must be built upon his own conscious geographic experiences and not upon definitions and the printed pages of a text. For the greater part of the work, the child is asked to go in imagination to regions he has never seen, there to work out and understand some of the relations which exist between the life of a people and their environment. To ask him to do this without giving him through experience the fundamental geographic concepts out of which he can build these mental pictures of distant lands, is to commit a crime against the psychological nature of the child.

The general acceptance of the truth of this principle has led to the introduction of local or home geography work into the lower grades in most schools. As yet, however, this work has not generally been so organized and correlated with the work of the other grades as to give the whole course the unity and interdependence which it should have. Superintendents have not yet sufficiently realized that since local conditions vary widely from place to place, not only the home geography work, but the courses built upon it, must also vary. There is too much of a tendency towards uniformity in our courses in local geography. . . .

The formulation of a course of study in geography is one of the most difficult problems which confronts the superintendent. It implies, in the first place, such a knowledge of the principles of modern geography and the regions of the earth as will enable him to recognize those features of the local environment which are not only closely related to the child's interests, but which are so common to all environments that through them, the child may reach with his imagination and understand the more distant regions of the earth. It implies, in the second place, such an appreciation of child nature and the ways in which the child acquires new knowledge as will enable the superintendent so to correlate the work of the whole course that the progress from grade to grade shall be without break in logical sequence while at the same time following a pedagogical order that shall do no violence to the developing mental powers of the child.

Even when the formulation of a course of study has been accomplished there still remains the serious problem of carrying into effect its various provisions. Take for example the course which has just been under discussion. Whatever it may lack and in whatever respect it may fail, it still has three things to commend it for which grade geography to-day stands in greatest need. In the first place it is not based upon and tied down to any existing series of text-books. Secondly, it places proper emphasis upon the map and map study, and in the third place it calls for abundant out-of-door observations. Now it is quite evident that back of these three phases of geography which the committee has emphasized, there is a fourth essential which must be assumed and without which little can be accomplished. To break away from the text as the course does, to make and study maps as recommended and to carry on the out-of-door observations as outlined, it is necessary to have in every grade a teacher who knows both the geography of books and the geography of out-of-doors far better than does the average grade teacher to-day. I should like to see this course of study attempted in every school in the state just for the sole purpose of convincing superintendents that their grade teachers, as a rule, are not well prepared in geography. Even then, in event of failure, I am not sure that it would not be the course of study rather than the teacher's preparation which would be blamed.

Aside, however, from the lack of adequately prepared teachers, another difficulty presents itself. Existing text-books as a rule are not such as can be easily and profitably used with such a course of study. Knowing that a majority of the teachers will follow a text and follow it blindly, authors and publishers have been so intent upon producing a book which will be popular and sell well because it can be thus followed, that they have forgotten as a rule the needs of the few well-prepared teachers who require a book of an entirely different sort.

There seem to be two respects wherein authors in adapting their books to the needs of the many, have thus failed to meet the needs of the few. On the one hand, an author attempts not only to describe and explain in his text but to teach and develop the whole subject as well. His descriptions and explanations are continually interrupted by questions and directions to the pupil. Another author, unable to assume a teacher, fills up his text with information which could have been acquired in some other way with far more profit to the pupil and a great saving of space for more important matter. Now a teacher who knows geography and can teach it will prefer to ask her own questions. She does not need or want an author to tell her pupils what maps to draw or essays to write. Then again there is a certain amount of information which a child can and should acquire for himself by observation, map study or reasoning, and the teacher does not want the beneficial effects of his acquiring it in one of these ways spoiled by the author telling it all in his text. What such a teacher wants is a book whose author recognizes her existence by leaving something for her to do, and then gives in clear, concise English, uninterrupted by questions and side issues, a fund of geographical information to which she can refer her pupils with some hopes of their finding what she wants them to find. What is such a teacher going to do, however, when, after having worked out with her class from globe and map, the main facts concerning the position, form, size and the surface of a continent, she turns to a text and finds in the six pages used to describe these topics, the facts which the class do not already know, can be stated on a single page—six pages of straw to be threshed over to get one page of badly shrunken wheat? What a drop in interest for these young explorers of globe and map to come to the text to find something of interest about the regions they have been thus studying and then to find only a dry recital of the very same facts which they had just discovered for themselves. After many such experiences with text-books, what is such a teacher going to do? Do just what so many teachers have been compelled to do who have tried to use existing texts with a course of study; viz.: abandon the text and look elsewhere for the desired information.

Although pupils can often be sent to these various sources of information with great profit, the teacher will still have need for a text-book from which she can assign definite lessons to be studied and mastered. The overcrowding of the grades caused by the so-called enriching of the course, has tended to increase the number of recitation periods and cut down the study periods until, in some schools, there is danger of the pupils becoming little phonographs, receiving and returning very accurately what the teacher gives them but still unable to acquire anything of themselves. To read a page of English and know what is written there is still a great art. To preserve that art and with it the art of study, there will always be a place for a text-book of geography in the schools. . . .

GEOGRAPHY IN THE GRAMMAR GRADES

Pupils who are in the last years of the grammar school ought to study synthetically. Hitherto they have studied as children, learning certain facts in order, because they are interesting, or because it was their duty to study as directed. They have not consciously looked far beyond this learning of facts. They should have now the power, and should be required to gather up these great groups of facts and view the subjects as a whole, with due relation of parts. This is the kind of work that fits their mental needs, and that will prepare them for the scientific study of the high school.—*From Report on Geography, New England Association of Superintendents.*

TRANSPORTATION—PART V*

BY J. T. HOLDSWORTH
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THE MERGER PERIOD

THE year 1898 marks the beginning of a period of rapid industrial expansion in this country. Many of the giant corporations, familiarly known as trusts, date from about this period, and the influences which gave rise to them were likewise responsible in large part for a new development in the railway situation. Capital in abundance sought investment in all kinds of commercial enterprises. Prosperity ran at full tide. The consolidation of small concerns into giant corporations proceeded at an amazing pace. In this general movement toward commercial and industrial centralization the railways shared. From their earliest development railways had found some unity of action essential to profitable business. The disastrous results attending unrestrained competition among rival lines had been common experience. Pooling was the most successful and practicable device attempted to maintain equitable rates and to obviate the needless wastes of competition. The prohibition of pooling and rate agreements came at a time of unprecedented prosperity and expansion in all branches of industry. Capital and confidence knocked at the door of enterprise all over the land. Under such conditions railway consolidation was as rapid as it was logical. Capitalists and promotors found no difficulty in floating the securities of new or acquired lines and mergers and consolidations followed fast.

These consolidations have been effected in various ways:[1] (*a*) by purchase or lease; (*b*) by the device of the holding company; (*c*) by community of interest. The great activity and confidence of capital in the last few years has made amalgamation by purchase possible in many cases. The sale of the Lake Shore to the Vanderbilt interests, of the Western Maryland to the Wabash, and the Central Railroad of New Jersey to the Reading, are instances of comparatively recent purchases. Other consolidations have been effected by lease, as in the case of the control of the Boston & Albany by the New York Central, or the joint lease of the Georgia Railroad by the Louisville and Nashville and the Atlantic Coast Line. A much older and more elastic method of amalgamation than either of these is the plan by which a group of railway capitalists purchase enough of the shares of another company to control its management. Thus the 'Frisco system controls the

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*Continued from Vol. IV, p. 80.

[1] Report of the Industrial Commission, Vol. 19, p. 310.

Chicago and Eastern Illinois, the Pennsylvania controls the Long Island R. R., and the Southern Railway jointly with the Louisville and Nashville controls the Chicago, Indianapolis & Louisville (Monon Route). In some cases control has been secured by the purchase of less than a majority of the shares of stock. The ownership by the Pennsylvania R. R. of $40,000,000 of stock out of a total of $105,000,000 gave that system control of the Baltimore & Ohio. Similarly the Union Pacific gained control of the Southern Pacific through the purchase of only $85,000,000 of stock out of a total of $192,000,000.

The most recent and satisfactory method of securing unity and harmony among rival railway interests is through "community of interest." By this method one or more of the directors or officials of one company are made members of the board of directors of another company, and often the influential members of each company become financially interested in the other. The term, community of interest, however, has come to be applied loosely to any arrangement by which one railroad becomes interested in the property of another. Instances of this new device for securing harmony among rival railway groups are plentiful. One of the earliest of such agreements was the joint control of the bituminous coal roads, the Chesapeake & Ohio and the Norfolk & Western, which had long been thorns in the flesh of railway amity, by agreement between the presidents of the Vanderbilt and Pennsylvania systems. Later, community of interest was established between the Pennsylvania and the Baltimore & Ohio. Early in 1903, it was announced that the Baltimore & Ohio and the Lake Shore had secured joint control of the Reading, which in turn owns a majority of the stock of the Central Railroad of New Jersey. Indeed, community of interest and joint control have proceeded so far that in many cases it is almost impossible to tell what interests actually dominate a particular road or system. Thus, in 1901, representatives of the Erie, the Lackawanna, the Central of New Jersey, and the Lake Shore entered the directorate of the Lehigh Vally Railroad. Mr. H. T. Newcomb, writing in the Review of Reviews for August, 1901, noted that eleven of the twelve directors of the Missouri Pacific were members of the boards of other companies, which operated at least 1,000 miles of line. One or more Missouri Pacific directors served at that time on the boards of the Chicago & Alton, International & Great Northern, St. Louis Southwestern, Little Rock & Fort Smith, Galveston, Houston & Henderson, Kansas City Southern, Central of New Jersey, Lackawanna, and numerous smaller railways. More recent instances might be cited to show the development of identification or community of interest in railway control. Thus, the New York Central directorate is represented in the Union Pacific, the St. Paul, the Northwestern, the Atchison, and others, and to cap the climax, Mr. E. H. Harriman, director in thirty-five railroad companies, enters the directorate of the New York Central. It is not unusual, now, to speak of the Harriman-Rockefeller group, or, even, of the Harriman-Rockefeller-Gould interests, which serves to indicate the extent to which association among the powerful railway groups has gone.

Consolidation through the device of the holding company finds several notable illustrations in recent railway history—the Rock Island Company, the Southern Pacific Company, the Northern Securities Company, and others. The Rock Island System is composed of "a parent holding company located in Iowa, and two large operating companies, each of which is also a holding company for the securities of other railroad companies."[1] The Rock Island Company controls the Chicago, Rock Island & Pacific Railroad Company, which in turn controls the Chicago, Rock Island & Pacific Railway Company. The Railroad Company has a controlling interest in the St. Louis & San Francisco, which owns the Kansas City, Fort Scott & Memphis Railway, which again in turn has a controlling interest in the Kansas City, Memphis & Birmingham.

The history of the rise and development of our railway systems abounds with dramatic incident, but the annals record nothing, perhaps, more spectacular, more significant, than the recent episode of the Northern Securities Company. The story of Northern Securities is much involved, but the following summary generalizes the salient facts. The Hill roads, the Great Northern and the Northern Pacific, stretching away from the headwaters of the Great Lakes and the Mississippi Valley in long parallel lines to the Puget Sound and the Pacific, lacked the one essential to highest success in Western railway traffic—direct entrance to Chicago. For years the Hill-Morgan interests manœuvred to secure a connecting link between their terminals at St. Paul-Minneapolis and Duluth, and Chicago, the greatest railway center in the world. Control of either the St. Paul or the Burlington would provide this link. In 1901, negotiations were entered into looking to the purchase of the St. Paul, but these advances failed. The Hill-Morgan interests then turned around and purchased the Burlington, paying for it about $216,000,000, in the joint bonds of the Great Northern and the Northern Pacific. Now, this alliance between the two great trans-continental roads at the north and the Burlington, whose lines spread out from Chicago to the great primary traffic regions of the trans-Mississippi states, seriously threatened the business of the great rival Pacific road, the Union Pacific. Accordingly, soon after the Burlington purchase, Mr. E. H. Harriman asked for the privilege of buying Burlington shares upon like terms to those granted to the Hill-Morgan people. His request was refused. Harriman then determined upon the bold move of buying up enough Northern Pacific stock to control that road and so indirectly to get possession of the Burlington. The result was the "raid" by the Harriman interests and the Northern Pacific corner culminating in the panic of May 9, 1901, with stock at $1,000 per share. When from the chaos order was restored, it was found that Harriman held a majority of the stock of the Northern Pacific. Out of a total capital stock of $155,000,000—$75,000,000 preferred and $80,000,000 common—he held $78,000,000, $41,000,000 preferred and $37,000,000 common. Inasmuch as the preferred stock holders had the voting powers it appeared, *prima facie,* that the Union Pacific had control of the Northern Pacific and thus of the coveted Burlington. But the charter of the Northern Pacific Company provided that the preferred stock might be retired at any time before 1917. The Morgan-Hill interests seized upon this provision, retired the preferred stock, added to their own holdings of common by purchase of additional shares, and so regained by strategy what they had lost in the battle of the stock markets. To prevent the recurrence of such a disastrous raid, and to establish their properties on a permanent stable basis, Hill and Morgan determined to form a "holding" corporation for the purpose of acquiring and holding the shares of the railroads under their control. Accordingly, the Northern Securities Company was incorporated in New Jersey on November 13, 1901. "Through Mr. Pierpont Morgan a compromise was effected by which all the clashing interests were represented in the new company. Within a short time after incorporation, the Securities Company had acquired 76% of the entire stock of the Great Northern and 96% of the Northern Pacific. The stockholders of the two competing companies disappeared, as such, for the moment, but immediately reappeared as stockholders of the holding company which was hereafter to guard the interests of both sets of stockholders as a unit."[1]

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[1] Prof. E. S. Meade, in Railway World, January 13, 1905.

Having weathered the gale of financial opposition, the Hill-Morgan combination was to face more trying storms from a different quarter. In the belief that the Northern Securities merger was intended to check the natural competition of the two parallel roads thus merged, the state of Minnesota brought suit against the Northern Securities Company on the ground that it was in violation of the anti-trust law. This suit came to naught through a decision of the Supreme Court that the state lacked jurisdiction. In March, 1902, however, a suit was entered in the Federal Circuit Court on behalf of the United States. This court held that the Northern Securities Company was a combination in restraint of trade, and issued a decree which in effect temporarily checked the further consolidations of the companies concerned. The case was appealed to the Supreme Court of the United States, which, after hearing arguments by some of the most brilliant advocates of the American bar, decided by a vote of five to four against the Securities Company. In affirming the decree of the lower court, the Supreme Court decision, though not pronouncing the holding company illegal, nor ordering its dissolution, broke it up effectually by enjoining the two railway companies from paying over to it dividends on the stock. Nothing remained then to the company but to return the stock to those who had given it in exchange for Northern Securities stock. This might be done in either of two ways: (1) by returning to each stockholder his original stock; or (2) by giving back to each shareholder an equivalent of his Northern Securities holdings in the shares of both Northern Pacific and Great Northern. The latter method was adopted. By this plan of redistribution, the Harriman interests, instead of receiving back their original Northern Pacific shares, and so control of the road, would receive a ratable proportion of the stock of both roads without control of either.

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[1] Annals of the American Academy of Political and Social Science, July, 1904.

Mr. Harriman and Mr. Pierce, as trustees for the Oregon Short Line, a Harriman road, began suit to prevent the Hill-Morgan interests from carrying out their scheme of redistribution. An injunction forbidding the distribution was granted by the New Jersey courts, but on appeal the case was carried to the Supreme Court of the United States which in March last handed down a decision which seems to remove the last objection to the Hill-Morgan plan of distribution, and which leaves possession of the Northern Pacific and the Burlington in the hands of that interest.

The effect of the Northern Securities decision upon prospective railway mergers and consolidations is very well summarized by Dr. Garner in the Annals already quoted. "The Eastern mergers," says Dr. Garner, "embracing about 85% of the railway mileage of the United States, will not be disturbed by the Government. This comforting assurance was given by the Attorney-General in an interview following the announcement of the decision of the Supreme Court. He declares that the Government during the prosecution of the Northern Securities Company refused to give any heed to the contention of the defendants that all the railroad 'mergers' in the country were on trial, but insisted that it was the validity of the Northwestern 'merger' only that was in issue. Having succeeded in suppressing this one, the Government did not propose to run amuck. No explanation was given why this particular one was singled out for prosecution and the others allowed to go free." In conclusion Dr. Garner doubts "whether after all anything of permanent value has been gained by the prosecution and the resulting decree of the Court."

Mr. Charles A. Prouty of the Interstate Commerce Commission comments on the Northern Securities decision in much the same vein: "Without attempting to forecast future decisions of the Supreme Court upon this subject, it is not too much to say that, in all human probability, the Northern Securities decision will not result in the dissolution of a single railroad combination now existing, except the Northern Securities Company itself, nor seriously interfere with the formation of other combinations."[1]

That these opinions are well-founded is attested by unabated activity in consolidations and mergers since the Supreme Court decision, notably in the case of the Père Marquette-Cincinnati, Hamilton & Dayton merger, the absorption of the Ontario & Western by the New York, New Haven & Hartford, and the incorporation in 1902 of the Rock Island Company, whose charter follows very closely that of the Northern Securities Company. Almost every annual report of the larger railway systems announces the absorption of minor roads or companies previously purchased or leased, and there are rumors of yet larger consolidations to come.

(*To be continued.*)

WEAKNESSES IN GEOGRAPHY TEACHING

Among the faults in teaching are these:

1. Too much talking by teachers without a purpose.
2. Lack of definite aim in teaching. "What do I propose to teach in this recitation?"
3. Failure to make use of the blackboard, map and globe.
4. Too much dwelling upon trivial details, such as comparatively unimportant cities, rivers, events, etc.
5. Dependence upon the text-book.
6. Lack of interest and enthusiasm on the part of the teacher.
7. Lack of broad and accurate scholarship.—*Indianapolis Course of Study.*

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[1] North American Review, June, 1904.

VACATION FIELD WORK FOR PUPILS

BY C. L. WALTON

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IN large city schools where several hundred pupils are studying physical geography, it is very inconvenient and in some cases almost impossible to do any satisfactory field work in connection with the subject. To be of much value to the pupil the places that are visited first should possess striking but simple topographic features, but after some practice in observation work has been obtained, less pronounced and more complex forms will give satisfactory results. As a rule pupils enjoy field work and hail with delight the announcement of an excursion, but their desires cannot always be gratified owing to poor transportation facilities or to distance from the school of the place of interest.

As a large number of pupils spend a part of the summer in the country, the teacher might suggest to them, in the latter part of the spring term, some lines of observation work to be carried on during their vacation. These suggested lines of work should be in harmony with the region that the pupils expect to visit and as definite as possible. In the Northern cities hundreds of pupils go to some inland lake where glacial topography is abundantly displayed and if they had some plan of observation work to follow, their outing would possess a value much beyond that of mere physical recreation. An hour or two each morning spent in research work would give zest and point to the pleasures of the remainder of the day.

During a visit last summer to a small glacial lake in Michigan the writer was reminded of the following simple lines of investigation which a pupil of average ability and with a year's training in physiography would have but little trouble in working out. Before much satisfactory field work can be done it will be found necessary to construct an outline map of the lake and vicinity on as large a scale as possible, say ½ or 1 inch to the mile, but if the lake is only two or three miles long then a scale of 4 inches to the mile or even 8 inches to the mile will be convenient. A large sheet of wrapping paper or a light colored window shade will be excellent for the map. For the purpose of locating points and estimating distances this paper should be ruled into quarter or eighth inch squares, and then with the help of a county map, which usually can be consulted, the section lines and general dimensions may be obtained. The details are to be filled in by careful observations and by measurements along the shore either with a tape line or by pacing. The first draft will probably not be very accurate, but during the summer corrections should be made until the map shows fairly well all the details of shore line in proper proportions. After the map has been corrected in pencil it should be gone over in ink.

The topography of the lake bottom should be shown on this map by 5 ft. or 10 ft. contours, depending upon the depth of the water. The sounding line should be a stout cord with knots tied in it every two or three feet and a half pound or a pound "lead" fastened to the end. The soundings must be made when there is little or no wind to drift the boat and at as frequent intervals as will give fairly accurate results. Two persons can do this work much better than one. The leadsman sits in the stern and the oarsman pushes off, gets his bearings, takes ten or twelve strokes and stops the boat; the leadsman lowers the line and counts the knots as they slip through the fingers until the lead reaches the bottom, and again counted, as a check, as the line is pulled in. Then the same number of strokes are again taken and the sounding obtained. These depths should be recorded on a piece of paper or a hastily sketched map and afterwards transferred to the permanent map. When the map has been well covered with data the contours should be drawn and the figures erased, excepting those that show the greatest depths. These deeps should be given appropriate names. A blue shading could be used to show the depth in addition to the contours.

While making soundings and at other times when anchoring about the lake, observations should be made on the character of the bottom, whether hard or soft, coarse or fine, composed of vegetable, animal or mineral matter. In some lakes deposits of carbonate of lime are forming, and if any are found their location and extent should be determined and recorded on the map. These deposits may form on clam shells and pebbles near the shore, and if found anywhere it is an evidence that dissolved limestone has been brought into the lake.

The most numerous and conspicuous water plants should be observed, their location mapped and their habits of growth such as depth of water and character of bottom carefully noted. The list should include the water arum or wild calla, the white water-lily, the yellow pond-lily or spatter dock, the pickerel weed, the arrow head, the chara, the blue flag or iris, the reeds and the pond weeds. All these grow at or above the surface of the water except the chara, which is the fine-leaved, ill-smelling, green weed often brought up with the anchor.

At the same time that other observations are being made the temperature of the lake water should be taken and tabulated. For this work a maximum-minimum thermometer must be used to get the temperature of the water at the bottom of the lake. The floats in the thermometer must be set, the instrument securely tied to the sounding line near the end and lowered to the bottom. Five minutes will be ample time for the mercury to become stationary when the thermometer can be brought to the surface and the temperature noted. In the deepest places the temperature should be taken for every five feet of depth, near the surface every two feet, and a curve plotted on cross-section paper to show how the temperature changes with the depth. The temperature of the deeps should be taken once a week and the surface temperature every day. If possible the temperature of the water running into the lake, either from streams or springs, should be compared with that running out of the lake as well as with the water in the lake itself. As the surface water drifts with the wind it will be observed that the temperature of the water, and consequently the bathing conditions, will depend somewhat upon the direction and velocity of the wind. The larger the lake and the stronger the wind, the greater will be the change in temperature. For the purpose of making general comparisons the air temperature should be taken early in the morning and in the middle of the afternoon.

If the lake has only one or two inlets the volume of inflowing water should be carefully measured. This may be done at a bridge where there is a uniform channel, by getting a cross-section area of the water and finding the number of gallons of water that flows through in a minute. The rate of flow can be ascertained by seeing how long it takes a chip or blade of grass to be carried from one end of the bridge to the other. A similar test should be made at the first bridge below the outlet and the difference in results will represent the water lost by evaporation, by soaking into the ground, by being taken up by plants and animals, etc. If any considerable quantity of water enters the lake from springs this amount should be made a part of the calculation.

The difference in clearness of the water at the inlet and at the outlet should be observed at various times and especially after a heavy rain when much sediment is brought into the lake. This experiment may be performed by taking a glass, or bright tin dish full of water at each place and noting the difference in distinctness of the bottom of the dishes when seen through the water. These two might be further compared with a sample from the middle of the lake. These comparisons will show where the sediment settles and also why the outflow is seldom muddy.

The amount of sediment held in solution by the water may be determined by evaporating to dryness, a dishful of water that has been filtered through two or three thicknesses of cloth to remove the suspended material and noting the amount of deposit on the bottom and sides of the dish.

This deposit probably consists of the carbonates of lime, magnesium, sodium, potassium, and possibly iron, salt, gypsum and silica.

The effect of the wind upon the lake should receive some additional attention to that mentioned above, such as the run of the waves considered in connection with the direction of the shore line, also where the waves are largest and go with the greatest speed, where they are wearing away the bank and where depositing sediment. Any changes in the shore line that the waves are making should be investigated and their character and extent determined. It may be found that long points of land have been worn away and that extensive fillings have been made elsewhere. Spits, hooks and sandbars should be carefully observed and the source of the sediment determined.

Observations on the variation in the height of the water should be made and the causes studied. The data for this study can be obtained by fastening a half submerged foot ruler to the pier or to a stake driven firmly into the lake bottom near the shore and where it will not be disturbed. If this gauge is placed at one end of the lake the effect of the wind will be better shown. To get the reading when the waves are running, the gauge should be shielded by a board or the boat and the average of the rise and fall taken to represent the true level of the lake.

The topography of the land immediately surrounding the lake should be studied as opportunity offers and represented on the map by 5 ft. or 10 ft. contours, the same as the lake bottom. With a little vertical measuring and some careful observation as to distance at the outstart, a very good map of the region can be made without the use of instruments. Roads, drives, paths, residences and other culture features should be located on the map. When the topographic work for both lake bottom and surrounding country is completed some later leisure time might be profitably spent in making a relief model of the place by using paper pulp or thin cardboard. If cardboard is used a sheet should represent a contour interval. The lake bed may be colored blue.

As far as possible the flora of the surrounding country should be studied; at least the names of the trees and the character of the soil in which each kind grows, whether high or low, wet or dry, sandy or clayey, should be noted. If there are islands in the lake it should be ascertained if the trees there are in any way different from those on the main shore under similar conditions of soil.

Observations should be made along the shore for evidences of a former extension of the lake. Old beach lines higher up the bank, low, swampy land bordering the lake in places and the wearing down of the outlet would be some of the indications. On the other hand the outlet may be filling up with weeds and driftwood and so raising the level of the lake. This may be shown by the waves cutting into the bank, by the absence of sandy beaches, by the decaying stumps of trees standing in the water and by the inlet having a drowned appearance.

The convexity of the earth's surface may be demonstrated if the lake has a shore line of such a character that three stakes of equal height above the water and at least a half mile apart can be placed in a straight line. By sighting over the stake at one end with a pair of field glasses, the second stake will appear a little higher than the third.

It is presumed that during all this time piscatorial pursuits are not neglected. The early morning and the late afternoon are prime occasions for landing some good catch. Here, too, the results should be shown on paper. An accurate drawing of the largest fish of the various kinds in the lake should be made, and if at any subsequent time a larger is caught, a drawing of it should replace the previous one. To make the drawing the fish should be wiped dry, placed on a piece of paper and the fins, tail and mouth slightly spread; then the outline can be traced with a pencil and the details filled in with the specimen at hand. The drawing should be labeled and such information as time of day, date, weight, place, depth of water, bait, etc., given. Such a "fish story" will be more convincing than any other kind can possibly be.

Photographic views of interesting places and objects will add very much to the value of the written results in each of the different lines of work.

The above suggestions for observation work are not all that might be mentioned but probably enough has been given to lead pupils to see what they can do in the way of original investigation if they so desire. Of course it is not expected that any pupil will complete all the work outlined even if conditions are most favorable, but they may select those that appeal to them and that appear most strking in their locality.

CORRELATION

Rationally followed the principles of correlation are of great value, but the teacher who is ever conscious when she employs correlation is doing poor work, because she is absorbed, not in her subject, but in the mechanics of presenting her subject. A good teacher cannot help having one subject assist another, but the transition from one subject to another should be as natural and easy as that of a carpenter when he drops a plane and picks up a saw.

EDITORIALS

EXPRESSION WORK IN GEOGRAPHY TEACHING

THE concise and well established educational phrase—"no impression without expression" seems to be one of those familiar and somewhat unfortunate phrases in modern educational literature which is often dangerous because accepted as a maxim when it is only partially understood.

That geography teaching often suffers because pupils are crammed with items of little value and not given an opportunity to show their knowledge in any effective way is unfortunately only too true. That many facts and principles in geography are of a nature to be effectively illustrated and that the knowledge of these facts and principles can be readily tested by their ability to express their conceptions through constructive work in wood, iron, paper, clay, sand, or by brush or pencil is equally true. It is not true, however, that for all pupils, manual training and art work form the only or even the best means whereby pupils can give expression to their ideas about geography. Many children are more skilful with voice or pen than in making things, and for such children to be compelled to express their ideas through their ability in fine arts or manual training and to have their knowledge of geography tested in this way is very unfortunate. Their results, judged from the standpoint of geography, may be less successful than the results of their less well informed colleagues who have a certain natural aptitude for manual training or art work.

If the phrase "no impression without expression" is interpreted broadly so as to give full value to oral or written presentation of thought, there is no quarrel with it from the standpoint of geography. If, however, it is interpreted narrowly as an argument for forcing manual training or art into the geography time schedule for all pupils, because it is assumed that in no other way can pupils really express themselves, geography teachers should express their disagreement forcibly. No argument is necessary to prove the value of manual training or art in a course of study, for their importance in the present and as contributions to a pupil's power are too great to be questioned. The value of these forms of education as things by themselves is not, however, a proof of their value to all pupils as handmaids to geography.

Geography teachers should encourage pupils to express their geographic ideas in the way that is most effective for the individual, and should apply manual training and art in their geography lessons whenever such work will make their geography more effective. They should suggest to the teachers of constructive work ways in which the facts and principles of geography can be applied in manual training or art work. The teacher of constructive work should adopt these suggestions if they are effective for their purposes. If, however, they can teach their particular subject better by not using suggestions drawn from geography they should neglect the geographic side at the moment.

The interrelation of subjects in the school curriculum should not be forced. One subject should be made to help others wherever possible, but let us remember that in the geography period we are primarily working with geography and that any intrusions that would weaken the effectiveness of our geography work are inexcusable even though the maxims of educational literature may seem to warrant such digressions. Coöperation between subjects implies mutual help and not one-sided sacrifices.

NEWS ITEMS

A New Association of Geography Teachers.—A number of teachers and workers in school geography living in and around New York City have recently formed the Geography Teachers Association of New York. The association will make a study of certain practical problems in school geography teaching and will hold monthly meetings during the school year at which reports of work will be made, problems discussed and better acquaintance promoted. The association is not to be formal in its organization or plan of work. Each member is expected to be a worker and contributor to the cause. Committees have been formed to prepare summaries and regularly furnish the club with references to available and valuable literature; to make similar summaries of useful government reports to be had on request; to keep in touch with new apparatus and equipment; to arrange and conduct excursions; and to arrange for the publication of materials of value to teachers. The affairs of the association will be managed by an executive committee of five, of which Miss Mary H. Kelton of Adelphi Academy, Brooklyn, is secretary. This committee will plan the meetings, outline the work to be done, receive the reports of the committees and decide on applications for membership. Through the courtesy of the American Geographical Society, the association will hold its meetings at the new home of the society on West 81st St.

RECENT PUBLICATIONS

Historic Highways of America. By Archer B. Hurlbut, Cleveland, Ohio, The Arthur H. Clark Company, 1905.

Volume 15, The Future of Road Making in America, pp. 211. Includes strong arguments for good roads and the necessity of coöperation in securing good roads. Also a chapter on the materials for roads, and the success of the movement in New Jersey. An excellent treatment of a timely and important subject. Illustrations not as eective as many that have appeared in Government and State Reports.

Volume 16, Index, pp. 188.

The Index volume includes all topics treated in the first fifteen volumes of the interesting and valuable but somewhat expensive series of volumes devoted to Historic Highways in America.

Negritos of Lambales, being Volume II, part 1, of the Ethnological Survey of the Philippines. By William Allen Reed, pp. 90. Manila, P. I., 1905.

A well illustrated and extremely interesting account of the mental, physical and social characteristics of the Negritos. Simply written and valuable for reference.

Long Range Weather Forecasts. By E. B. Garriott, U. S. Department Agriculture—Weather Bureau, Bulletin No. 35, pp. 68. Government Printing Office, 1904.

Valuable summary of the possibility of long range weather forecasts. Sections on the relation of the weather to the moon and the sun should be read by all interested in weather or good geography teaching.

Wall Outline Maps [32x44]. Published by The McKinley Publishing Co., Philadelphia, Pa.

The two outline maps devoted to the United States and to Europe recently published by the McKinley Co. are most excellent and valuable. Printed on good paper of a neutral tint, they furnish excellent bases for making maps for class use, to illustrate social, political, historical and economic facts, not available as wall maps that can be bought in the open market.

"NATURAL PHENOMENA"

Courses of study in geography and suggestions as to geography in the primary grades frequently include the topic "Natural Phenomena" as one of the several groups of topics pertinent to elementary work. This is usually meant to include observations of the weather, of the work of running water and similar out of door phenomena. The term "Natural Phenomena" is not, however, clear as to meaning, and implies that geography may include also unnatural or supernatural phenomena. It is a good instance of a term loosely and carelessly used, as terms in geography should not be.

CURRENT EVENTS

THE WORLD'S HIGHEST BRIDGE ACROSS THE ZAMBESI

THE British South Africa Company at London, received a cable dispatch from Victoria Falls announcing that the bridge over the Zambesi River, the highest in the world, was linked up at 7 o'clock on the morning of April 1, thus completing another link in the chain of the Cape-to-Cairo Railway.

THE CAPE-TO-CAIRO RAILWAY

The Cape-to-Cairo railway, for which the great bridge over the Zambesi has just been linked up, its arch 420 feet above the water of the river, is in many respects one of the most remarkable projects which ever emanated from the brain of man.

It is the first great trunk railway ever designed to span a continent from north to south. It is the first railway projected to cross the equator at right angles and the only railway in the world which has ever been designed to cross territory across which no road, trade route or human traction way has yet existed. No Government is at the back of it. No financial syndicate hopes to make money out of it. That it should exist even in the realm of imagination is due solely to the creative genius of one man, and that the man who was stripped of all his official positions and solemnly censured by a Parliamentary committee.

To Cecil Rhodes—who died when only about 3,000 miles of the 6,600-mile line was completed—must be given credit for the vast plan to develop a continent.

The cost of the entire line will be not less than $125,000,000—perhaps a great deal more. But at the beginning he furnished most of the money himself. Pushing up from the Cape through Rhodesia, he met his first great obstacle at German East Africa. For the right of way through 700 miles of its territory the German Government drove a hard bargain. It forced him to agree that at the end of forty years it should take over that part of the line which traversed its land.

Steadily but surely the railway has progressed. North from Cape Town, and south from Cairo and Khartoum, it has evolved from a formless dream into a line of steel that is opening one of the great empires of the future to civilization.

Already the most stupendous tasks—one of which was the bridging of the Zambesi—have been accomplished. By 1909, the date set by Rhodes, the African empire builder, the gigantic project may be completed.

CROPS THAT WILL RIPEN AROUND THE WORLD DURING APRIL

WHEAT.—Northwest Province and Bengal, India (ending); Punjab, Sind, Central States, Rajputana and Bombay, India (beginning); Upper Egypt (begins late in month); Mexico.

OATS AND BARLEY.—Northwest Province, Bengal and Punjab, India; Canary Islands, Egypt.

CORN.—Cape Colony, Victoria, Australia, Tasmania, New Zealand, Argentina.

RICE.—Burma and Bengal, India (summer crop).

BUCKWHEAT.—Victoria, Australia.

CLOVER.—Egypt, Victoria, Australia.

ALFALFA.—Southern California, Arizona, New Mexico, Mexico.

PASTURE.—Along Tropic of Cancer.

COTTON.—Paraguay, Uruguay, Brazil, Peru, Bolivia, Bombay, Madras, Northwest Province, Nizam, Patria, India.

SILK.—India, Siam (begin to reel from cocoons).

FLAX.—Egypt (to April 15).

RAMIE.—Egypt(spring crop).

SHEEP SHEARING.—Texas, Arizona, New Mexico, California.

SUGAR BEETS.—Egypt (end of winter season).

MAPLE SUGAR.—New England States, Canada, and, to a lesser extent, throughout northern tier of states to Minnesota.

FRUITS.—STRAWBERRIES—Florida, Southern California, Arizona, New Mexico, Texas, Louisiana, and along Gulf; Egypt, Northern Africa. APPLES, Algiers (early). APPLES, PEARS, ORANGES and other CITRUS FRUITS are near the end of their season in India, Egypt, Northern Africa, Southern Europe, West Indies, Central America, California and the South Sea Islands. The first PLUMS are ripening in Arizona. PERSIMMONS and GUAVAS, Victoria, Australia.

VEGETABLES.—April in the Northern Hemisphere corresponds to October in the Southern. The season for green things at Cape Town, Buenos Aires and Sydney has come to an end, while along the Tropic of Cancer all garden vegetables are had in abundance. Southern Europe, Cuba, Mexico, the Gulf States and Southern California have LETTUCE, RADISHES, ONIONS, PEAS, STRING BEANS, BEETS and ASPARAGUS. In the warmer regions, TOMATOES, POTATOES and CUCUMBERS are ripe, and all these have found their way to New York and London markets. India and Australia are digging SWEET POTATOES, and all the Southern Continents their winter supply of POTATOES.—*The Little Chronicle.*

WIRELESS TELEGRAPHIC FEAT

A message has recently been sent from the Marconi station in Cornwall, England, to a station in Ancona, Italy. It was safely transmitted and duly answered. It is not the distance between the two points that is remarkable, as this is only 1,000 miles; but the fact that the message had to be sent overland. The electric waves had to pass over nearly the whole of France and a fair portion of Italy, including some of the highest peaks of the Alps. Herein is the surprise, as it has been thought that land transmissions were doubtful, because of the many intervening obstructions.

WATCHING FOR HURRICANES

The "hurricane belt," as it is commonly known, lies, roughly speaking, between latitude 10° and latitude 30°, north, and extends from the western shores of the Gulf of Mexico almost to the Azores. During August and September, however, which constitute the middle months of the hurricane season, the region of the West Indies is peculiarly liable to disturbances, more especially the Caribbean Sea, where some of the most disastrous storms on record have reached their maximum intensity. To protect our vast shipping interests in these waters and to warn our southern coasts when a hurricane threatens, is one of the most imperative duties of the Weather Bureau.

Nine stations in all have been established; one at Havana and one at San Juan being open the year around. Three others in Cuba and one each in Santo Domingo, St. Kitts, the Barbadoes and Curacao are open from July to November. These stations are in charge of trained officials sent out from the United States; but regular reports are also received from special local agents at various points, as well as from the captains of vessels, while official exchanges are made with the British stations at Jamaica and elsewhere.

From the information thus collected a most comprehensive view of the whole hurricane region is gained and the slightest disturbance noted. Should a dangerous storm be feared, the central bureau demands constant observation from the affected area, and by notifying the other stations of the danger, the whole service is put in readiness for instant action. Thus within a few minutes after the receipt of a warning message from San Juan, every station from Havana to the Barbadoes can be notified and placed not only in the closest touch with the Washington bureau, but each with the other. Such a system is unequaled the world over and calls forth the highest praise from the masters of foreign vessels, which, of course, share the benefits equally with American shipping.—*The World To-Day.*

THE WANING GLORY OF NIAGARA

Those who wish to see Niagara Falls in anything like their primitive beauty and grandeur must not delay their visit very long. The hydraulic plants already in operation, when in full head, divert 48,800 cubic feet per second from the Niagara River above the falls, or 29% of its minimum flow. When all the works now operating or under construction are carried out to their full authorized capacity, the water withdrawn will be 67,406 cubic feet per second, or 41% of the minimum discharge rate of Niagara River.

These are the figures given by Mr. Alton D. Adams, in the current number of *Cassier's,* an engineering magazine. They are an engineer's exact calculation. When these plants are at work the volume of water going over the falls will be less by two-fifths than it was five years ago, and the spoliation has only begun. New York makes concessions to power companies to take Niagara River water in competition with the Province of Ontario, giving concessions on the Canadian side. The only way to stop this is by international agreement between the American and British Governments, but the New York Legislature has recently rejected a proposition to ask for this intervention.

Forty-one per cent. of the Niagara water having been given away in this way, it is not to be presumed that the remaining 59% will be held sacred. Before the plants now constructing are finished there will be fresh applications for power privileges from both sides of the river, and, judging by the past, they will be granted almost as soon as they are requested by parties who know how to interest Legislatures in their schemes. The very natural conclusion of Mr. Adams is that:

"Niagara Falls are doomed. Children already born may yet walk dryshod from the mainland of the New York State Reservation to Goat Island across the present bed of the Niagara River."

From his statement of fact and calculation he clearly postpones the day of doom too long. When the plants now constructing are all in full operation and two-fifths of the Niagara water are withdrawn from the river the relatively shallow channel that leads to the American fall will be dry and men of the present generation well advanced in age will not be too old to walk dryshod to Goat Island "across the present bed of the Niagara River." Let us hope that the Canadian fall may last a generation longer, but even of this there is no assurance.

There are some who will not regret this destruction of Niagara. They regard the conversion of its force into electric power as more than a fair equivalent for the destruction of the beauty and grandeur of the falls. But Niagara of right belongs to the millions who view it with fascination and never-tiring delight. The power that its current is being converted into belongs to a comparatively few private individuals, who use it for their personal gain.

If Niagara was the only point capable of furnishing electric power there would be some excuse for its spoliation, but this country is rich in water power now going to waste. It may not be in such a convenient and concentrated form as at Niagara, but it is available. Still, if the people of this country remain supine and make no commanding protest it will require a very few years to convert the glory and the grandeur that were Niagara Falls' into horse-power and volts.

ACCURACY OF WEATHER FORECASTS IN NORFOLK, VA.

The most varied weather in our country is found along the Atlantic coast. Hence it is in this section that the greatest chances for error are to be expected in making official forecasts of the weather.

The following report for eight months in 1904-1905 of the success of weather forecasts at Hampton, Va., shows that the degree of accuracy is very great and that the accuracy is much greater in winter when the weather changes are more contrasted than in summer when the weather is more uniform, and the changes are very slight from day to day:

	July	*Aug.*	*Sept.*	*Oct.*
No. of forecasts received from Washington	26	27	25	26
" " " correct	15	16	17	18
" " " partly correct	8	9	7	8
" " " wrong	2	2	1	0

	Nov.	*Dec.*	*Jan.*	*Feb.*
No. of forecasts received from Washington	25	26	24	23
" " " correct	15	21	20	18
" " " partly correct	9	4	1	3
" " " wrong	1	1	3	2

NOTES

ESTIMATING DISTANCES.—It is important that children should have much drill in estimating distances; it has its value not only in the study of geography, but in all the affairs of life as well. Let them be supplied with measures, foot-rules, etc., and encourage their constant use. It is not necessary to spend much, if any, money for the purpose; many merchants will freely give, for advertising purposes, excellent foot-rules, yard-sticks, etc. Or the ingenious teacher can easily make them from good cardboard. Let the pupils estimate the length of their slates, the width of their desks, the size of the school room, the length and width of the yard, and a multitude of other objects, taking care in every case to verify their estimates by careful measurements. I think it would be easy to arouse an interest in such work that would almost amount to a passion. To get ideas of longer distances, a neighboring field, city block or familiar piece of road may be used. To pupils thus trained, it will mean something when they are told that a monument or tower is so many feet high, or that a river, road or street is so many feet wide. If they read that Denver is 5,000 feet above sea level, let them think of the piece of road a mile long set up on end to represent this height. To most students of geography, probably such statement of distances means nothing beyond the figures in which they are expressed. The height of Mt. Washington given as 60,000 feet instead of 6,000 would mean only a difference of one zero.

SOME GEOGRAPHIC DON'TS.—Don't use "up" for *north,* nor "down" for *south.* "Down" is with the pull of gravity and ends at the center of the earth. "Up" is opposite to the pull of gravity and ends at infinity. The directions *up* and *down* are parallel with the earth's radii, and, therefore, cannot be used for the cardinal directions *north* and *south.* North and south directions lie in a horizontal plane, while up and down directions lie in a vertical plane.

This confusion of terms results from the use of "wall" maps, which for the accommodation of the class are presented in a vertical plane, with this instruction: "*North* is towards the top of the map, and *south* is towards the bottom." If maps were displayed in a horizontal plane, and with respect to cardinal directions, then all surfaces of standing water would be regarded as absolutely *level,* and all plains and plateaus as approximately level, and "up" and "down" could not be used for *north* and *south,* but would be reversed for directions to and from summit and base of ridges of lands, directions for which north and south are not interchangeable.

The incorrect use of "up" and "down" has led some children to think that rivers must necessarily flow southward. The supervisor heard one child say in class, "No river flows north," and saw another child trace the St. Lawrence river to its mouth in Lake Ontario. A third child, when asked to point towards Quebec, pointed in an upward direction, endeavoring to reproduce map direction. Evidently his only idea of Quebec's location was a small black dot on the map. The expression, "up the St. Lawrence to Quebec," is not infrequently heard in the lower-grade work. That city is no more real to many beginners than the giant's house at the top of the beanstalk.

Don't confound cardinal directions with cardinal points. Cardinal points are points fixed in the horizon; cardinal directions are directions towards cardinal points, and, therefore, lead in a horizontal plane. "Level" is at right angles to the pull of gravity. Antipodal points are the ends of a diameter of the earth, hence are not points in the same small circle, even if these points are on opposite sides of the earth.—*American Education, March, 1905.*

COAL RESOURCES OF THE UNITED KINGDOM.—Governments do not and cannot allow the needs of a remote posterity to have much influence on their actions, and the people of this country may congratulate themselves upon the discovery that no drastic steps will be necessary to eke out our coal supplies for several centuries to come. The royal commission on coal supplies has conducted its investigations with all the care and thoroughness that the magnitude and importance of the problem merit. It has received and weighed the evidence of no fewer than one hundred and twenty witnesses, most of whom were nominated by the various associations concerned in the subject-matter of the inquiry, and it is safe to say that no authority or information that could materially influence the findings of the commission was left out of consideration. In the result we have the estimate that the available quantity of coal in the "proved" coal fields of the United Kingdom is 100,914,668,167 tons, which is alone sufficient to meet our needs for three hundred years. This estimate, too, is very conservative, for it is arrived at without including the coal at depths exceeding 4,000 feet or in seams thinner than 1 foot, and it allows an unnecessarily large margin for progressive increases in consumption, while no deduction is made for progressive economies. On the same generous basis of consumption there are supplies for one hundred and thirty years—40,000 million tons—in coal fields at present unworked. Altogether, with the coal of the undersea area and at workable depths below 4,000 feet, supplies are available for nearly five hundred years. It is a blessed relief also to know that there is not the remotest prospect of even the best of the Welsh steam coal failing the market for over two hundred years, the available supplies being estimated at 3,937 million tons. The present annual output is 18 million tons, and every effort is being made by consumers to find less expensive substitutes. It is true that, as regards the coal trade as a whole, the commissioners "look forward to a time, not far distant, when the rate of increase of output will be slower, to be followed by a period of stationary output, and then to a gradual decline," but it is clear from the report that immense economies in consumption can be effected and are likely to be effected. Out of the annual home consumption, for instance, of from 143 to 168 million tons, there is a possible saving of from 40 to 60 million tons. The influences making for economy are already potent and will inevitably rob the first sign of the permanent upward movement in the price of coal of much of its significance of evil. It is well that it is so, for after considering the claims of possible substitutes — alcohol, natural gas, oil, water power, windmill power, and peat—the commissioners are convinced that while there are sources of power which may slightly relieve the demand for coal, our only reliable source of power is coal, and that there is no substitute.—*Monthly Sum. Com. and Finance, Jan. 1905.*

CURRENT ARTICLES ON COMMERCE AND INDUSTRY

February

Advertising, Waste in, *Bookkeeper.*
Agriculture, The Vital Facts in, Tillage (Ill.), *Country Life in Am.*
Agriculture: "Helping the Farmer" (Dept. of Agri.), *Nat'l Geog. Mag.*
Canada: "Outposts of Empire" (Ill.) *World To-Day.*
Corn Culture, Modern, *Export Implement Age.*
Cotton Picking Machine, *Sci. Am.,* Feb. 18.
China, The Wonderful Canals of, *Nat'l Geog. Mag.*
Cypress, *Miss. Valley Lumberman,* Feb. 17.
Everglades of Florida (Ill.), *Century.*
Food, Standards of, *Comm. Bull. and N. W. Trade,* Feb. 18.
Glass, The Mfg. of Plate, *Paint, Oil and Drug Rev.,* Feb. 8.
Indian Cotton Crop, *Crop Reporter.*
Korea and the Koreans (Ill.), *Century.*
Log-Rafting on the Ocean (Ill.), *World To-Day.*
Macaroni, The Mfg. of, *Comm. Bull. and N. W. Trade,* Feb. 28.
Mining: "The Conquest of the Mountains" (Ill.), *World To-Day.*
Mississippi Valley, Growth of Population in, *World To-Day.*
Negro's Chance (Ill.), *Sat. Evening Post,* Feb. 11.
Niagara, Opening of the Canadian Power Co. Plant, *Sci. Am.,* Feb. 4, 11.
Norway and Her Trade (Ill.), *Bookkeeper.*
Panama Canal and Its Problems, *Rev. of Revs.*
Railroads, How They Build Up the West (Ill.), *World To-Day.*
Railroad Regulation, *Sat. Evening Post,* Feb. 18, 25, March 4.
Russia, *Nat'l Geog. Mag.*
Venezuela, The Industrial and Commercial Outlook in (Ill.), *Rev. of Revs.*
"Welfare Work"; Some Principles and Developments of (Ill.), *Bookkeeper.*

E. D. J.

LOG HOUSES, SOD HOUSES AND ADOBE HOUSES.—Mr. W. D. Johnson describes an interesting adaptation of building material to climatic conditions. On the plains in the West, which have ample rainfall, the stream bottoms are timbered and thus furnish lumber and logs for the houses of the settlers. Further west is the sub-humid belt, where the rainfall is too scanty for most crops and the streams are not plentiful. There is consequently little timber, but the ground is covered with a thick, tenacious sod which gives the region the name of the "short grass country." Here the sod is cut and built to a thickness of two feet or more, and makes a durable, comfortable dwelling. The roof is supported by beams which are covered with shingles when they are to be had, but often with sod, which remains green during the summer and often flowers are grown on the roof. Still further west in the arid belt the sod is not continuous and the grass grows in tufts, giving the belt the name of the "bunch grass country." Here, in absence of either sod or timber, the houses are largely built of "adobe," or sun dried mud. Mr. Johnson's paper is a part of the United States Geological Survey's report for 1900-01, Part IV., and is entitled "The High Plains and Their Utilization." Besides the problems of irrigation, the article contains a very readable account of the "boom" times in Kansas and Nebraska and their climatic factors. F. V. E.

SELECTED REFERENCE LIST FOR TEACHERS

General.

Longman's Gazetteer. Longmans. The authoritative pronouncing and spelling gazetteer of the world. Contains excellent brief descriptions of all important places.

Andree's Hand Atlas. Velhagen and Klasing, Leipzig. Recent reference atlas containing excellent climatic maps and maps showing distribution of peoples, religions, plants, animals, etc.

Stieler's Hand Atlas. Perthes, Gotha. The leading reference atlas.

Mill, *International Geography*. Appleton. The best single volume reference book on general and regional geography.

Stanford's Compendia (Reissue). Stanford. The leading reference books on the several continents. Two volumes each on Asia, Australia, North America, Central and South America, Africa and Europe.

Mill, *Hints to Teachers and Students on the Choice of Geographical Books for Reference and Reading*. Longmans. A very helpful reference list with brief comments on the individual references. Gives general and special references.

The Teaching of Geography.

Geikie, *The Teaching of Geography*. Macmillan. A very suggestive book on the essentials of good geography teaching.

McMurry, *Special Method in Geography*. Macmillan. Discusses the scope of geography and outlines a course emphasizing the teaching by types.

Redway, *New Basis of Geography*. Macmillan. Interesting and helpful for teachers in upper grades who need to teach continents from the practical standpoint.

Dodge and Kirchwey, *Course in Geography in the Horace Mann School.* Teachers College Record, March, 1901. A detailed outline of elementary and secondary course in geography in Horace Mann School, Teachers College, Columbia University.

Physical Geography.

Mill, *Realm of Nature.* Scribners. A very valuable and simple book on physical and mathematical geography and on biogeography.

Davis, *Physical Geography.* Ginn & Co. An authoritative secondary school text, particularly helpful in reference to the land features.

Davis, *Elementary Meteorology.* Ginn & Co. The leading English book on weather and climate.

Ward, *Practical Exercises in Elementary Meteorology.* Ginn & Co. Very helpful to teachers who have to deal with weather phenomena.

Gilbert & Brigham, *Introduction to Physical Geography.* Appleton. An interesting, authoritative and well illustrated secondary text on physical geography.

Harrington, Mark W., *About the Weather.* Appleton. Very helpful for teachers in elementary grades.

Dodge, *Reader in Physical Geography for Beginners.* Longmans. Small volume on physical geography, available as an introduction to the subject.

Biogeography.

Ratzel, *History of Mankind* (3 vols.). Macmillan. A very comprehensive book on the races of mankind, the first volume being particularly valuable for its consideration of the problems of race distribution.

Wallace, *Island Life.* Macmillan. Classic book on animal distribution from geographic standpoint.

Guyot, *Earth and Man.* Scribners. One of the older books, and hence not written from a modern standpoint; but still invaluable for presenting the relation of earth features to life.

Herbertson, *Man and His Work.* A. and C. Black. A very usable and interesting small volume, showing the manner of life of people living in different vegetation regions and amid different surface conditions.

Lyddeker, Hutchinson & Gregory, *Living Races of Mankind.* Hutchinson & Co. Two splendidly illustrated volumes on the races ot men, simple, and popularly written.

Adams, *Commercial Geography.* Appleton. An accurate, well ordered and almost indispensable book on commercial geography. Maps and diagrams are very numerous and helpful for the teacher.

RIVERS BEARING "SLUDGE."—Baron Nordenskiold, in the *Geographical Journal* for May, 1903, p. 523, describes some interesting river deposits in the west part of the Gran Chaco, near Tarija, Bolivia. Here the rivers seem to issue from the mountains into the Chaco in a dry thicket on a ground of dust, a country as amiable to the traveler as the Australian Scrub. Of the rivers only the Bermejo and Pilcomayo get to the Paraguay, the rest losing themselves in the ground. "Close to the mountains they deposit stones and gravel, and simply carry fine silt out into the Chaco. A river like the Pilcomayo has no determined course, but in the Chaco divides and distributes itself in swamps at random. During the rainy period these rivers, having an abundance of water, deposit vast masses of sludge; during the dry season, the quantity of water being greatly reduced, the sludge deposited by the river turns into dust, which, blown about by the wind, is spread far and wide. The loose soil of the Chaco seems to me, as previously stated, to be formed of sludge deposited by the rivers and afterwards transported by the wind. It is scarcely probable that sediments carried through the air from distant parts should form any considerable portion of these deposits. Sections made through the earth strata of the Chaco prove it to be loose, characteristic, unsifted, porous dust, full of the shells of numerous land molluscs.

In order to comprehend how enormous masses of sludge can be carried along by the rivers, we must duly consider the rainfall. Whereas, in the north of Europe, it is only during spring that the streams transport any large mass of solid material, the rivers of South America are thick with sludge during the entire period of the rainy season. Storms are also far more violent in these regions than in the north of Europe. On the route from Quinta to Salta, the Rio San Francisco is crossed. I have traversed it when there was but little water; this same river, however, annually claims some victims among those who ford it at flood-tide.

A rider, wishing to cross the river after rain, perished in the attempt, and all that was ever found of horse, rider, or saddle was a saddle-bag, everything else had completely vanished. The great difference in elevation also favors this accumulation of silt in the Chaco. The rivers come from a height of several thousand feet, with an exceedingly abrupt fall into the Chaco, where the further flow has a very slight descent."

The same number of the *Journal* at p. 558 reports similar phenomena at the headwaters of the Musa river in British New Guinea. "Many of the streams flowed with a thick milky looking water, while in traversing their wide flood channels the traveler sometimes sinks to the knees in a kind of pipeclay slush. These strange waterways are attributed to landslips in the Goropu range, which hold back the water until it at last bursts forth carrying devastation in its train." M. S. W. J.

THE JOURNAL OF GEOGRAPHY

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SUMMER SCHOOL COURSES IN GEOGRAPHY 1905

THE JOURNAL OF GEOGRAPHY presents in this number a brief announcement of the courses in geography and geology to be given at colleges and normal schools during the coming summer, so far as the necessary information has been obtainable. For convenience of reference the grouping given is by states.

Intercollegiate Appalachian Course in Geology

A GEOLOGICAL field course of five weeks' duration, for men only, will be given under the direction of several instructors, as follows:

July 3-8—Professor W. B. Clark of the Johns Hopkins University, Baltimore., Md., on the Tertiary and Cretaceous Strata of the Coastal Plain of Maryland.

July 10-15—Professor W. M. Davis of Harvard University, Cambridge, Mass., on the folded Palaeozoic Strata of the Susquehanna-Juniata district of Pennsylvania.

July 17-22—Professor T. C. Hopkins of Syracuse University, Syracuse, N. Y., on the horizontal Palaeozoic Strata and Glacial Features of Central New York.

July 24-29—Professor H. P. Cushing of Western Reserve University, Cleveland, Ohio, on the faulted Crystalline and Palaeozoic Rocks of the Little Falls district, N. Y.

July 31-August 5—Professor J. Barrell of Yale University, New Haven, Conn., on the Metamorphic and Triassic Rocks of Western Connecticut.

This course is intended for men who have already some knowledge of general geology, including field work. The party will meet in Baltimore on Monday, July 3. The fee for the course is $20, payable in advance to Professor W. B. Clark, Johns Hopkins University, Baltimore, Md. The work of each week may be taken separately; the fee in this case will be $5 a week, payable to the instructor of the week. It may be necessary to limit the number of students in the first week; preference will be given to those who take the entire course.

CALIFORNIA

Leland Stanford Junior University

Course 3—Topographic Geology: conducted by Professor J. F. Newsom. Field and laboratory work in making topographic and geologic maps and sections. Transits or plane tables are used in doing the topographic work and in locating outcrops and geologic contacts. An area of from one square mile to one and a half square miles must be mapped topographically, and have its areal and structural geology worked out by each student. The time required is from six to seven weeks, the student working from ten to twelve hours per day. The work is done at some point in the Santa Cruz Mountains, not far from Stanford University, beginning July 20. Prerequisites: General Geology (Course 1), Field Geology (Course 4), and Surveying. The fee for students not members of Stanford University is $25, payable in advance. The field expenses will be $40 or $50.

Course 4—Field Geology: conducted by Professors J. C. Branner and J. F. Newsom. This course is designed to teach the student the methods of working out areal, structural, and stratigraphic geology in the field, and of representation of geologic data on maps. The topographic maps furnished by the United States Geological Survey are used as a basis for the work. The students are required to make field notes, to run cross sections, trace out contacts, etc. This course requires forty-two days' work of ten hours per day. For the last four summers the work has been done in the Santa Cruz Mountains, California. In 1905 it will probably be done in the Mount Hamilton Range, in the vicinity of Mount Hamilton, California, beginning May 26. Prerequisites: General Geology (Course 1), and Surveying. All students taking this course are charged a fee of $25, payable in advance. The field expenses will be $40 or $50.

Correspondence relative to these courses should be addressed to Professor J. C. Branner or Professor J. F. Newsom, Stanford University, California.

University of California, Berkeley, June 26-August 5

Ruliff Stephen Holway, A. B., M. S., Assistant Professor of Physical Geography. Frank Forest Bunker, Ph. B., Supervisor of Training, State Normal School, San Francisco.

1—Physiography of the Lands. Assistant Professor Holway. Lectures and discussions on the various forms of relief, their origin and present stage of evolution, including some study of the effect of geographical conditions on history and the interaction between life and geographical environment. As far as practicable the work will be based on field excursions to be held on Saturdays; special excursions will be arranged for on certain afternoons. Opportunity will be given for laboratory work in the making and interpretation of maps and of models.

2—General Climatology. Assistant Professor Holway. The course will consider Climatology in a broad way, and will include the following factors in their relation to climate: the astronomical relations of the earth and sun, the atmosphere and elementary meteorology, the ocean and ocean currents. The course will be illustrated by experiments in the elementary science involved.

Courses 1 and 2 are designed first to cover the work in Physical Geography in the secondary schools, and secondly, to give some treatment of the lines of more advanced study which may be followed by teachers of this subject. Particular attention will be given to available sources of information concerning physiographic conditions in California.

3—General Geography: Content and Method. Mr. Bunker. The most typical features—historic, economic, artistic, political, or commercial, as the case may be—of each of the natural geographical areas of the world will be chosen; selected references, for the most part to current magazines, will be given on each to be read; and, with this as a basis, through discussions and lectures the attempt will be made to amplify the teacher's general information to such a degree as to make her the master of the text, rather than its slave. Use will be made of the unexcelled informational opportunities which the Bay region affords through Saturday visits to the plants of the various industrial activities thereabouts. Throughout the course much attention will be given to methods of presenting the material of geography to the children of the grades. Particular consideration will be given to the use of the present state-series texts in this connection. Those taking the course will be expected to become familiar through use with the juvenile books which are best adapted to supplementary purposes.

CONNECTICUT

Yale University, New Haven, July 6-August 17

Geology—A course of lectures on the general principles of the science of Geology. Such topics will be discussed as will give an understanding of the structural features of the earth; of the forces by which its present condition has been attained; and of the past history of the earth, including a brief discussion of the evolution of living forms.' The lectures will be supplemented by the use of a text-book and illustrated by specimens and lantern views. Excursions to points of geologic interest will be arranged. This course in Geology is elementary in character and is designed to supply the teacher with the facts and theories necessary for the presentation of similar courses in High Schools, Normal Schools and Colleges; and at the same time to suggest methods of conducting classes and field excursions. For such students as make Geology their chief study and who desire to devote practically all of their time to this course, arrangements will be made for additional work. Such work may consist of study of rock-making minerals, of rocks, of fossils; the detailed mapping of limited areas about New Haven; study of the literature of selected geologic topics, etc. Professor H. E. Gregory.

Physiography—A study of the physical features of the land; ocean; climate; the bearing of these factors on human life. In connection with this course the methods of the United States Weather Bureau will be studied, and frequent field excursions will be conducted. The object of this course is to present the chief topics of physiography in a thorough manner; to furnish the student with subject matter for Physical Geography and a basis for teaching modern Geography, and to suggest methods for conducting similar courses. The field and laboratory work in determination of latitude, preparation of weather maps, study of topographic maps and models, etc., is designed to illustrate methods. For such students as wish a fuller course selected areas of the United States will be studied, both for their value as illustrations of important physiographic features, and as a means of acquaintance with local fields. Such students will be required to do much additional reading. Professor H. E. Gregory and Mr. I. Bowman.

Commercial Geography—This course is a general study of the relation of man to his environment. Climate, soil, topography, and other physiographical factors will be treated as conditioning factors of the production and distribution of goods destined for the satisfaction of human wants. Distribution of the materials of common food (and their physiological values), clothing, building materials, etc. Conditions of transportation: natural water-routes, winds, ocean currents, harbors. Complementary trade-areas, trade-routes and their historical importance. Direct influence on man, as a producer and consumer, of the conditions of natural environment: climate (acclimatization), topography, flora and fauna, etc. Race characters and race distribution; the geography of disease, etc.

The study of Commercial Geography is assuming year by year an increasing importance in secondary education. The text-books on the subject are prevailingly statistical in treatment. In view of these facts, it is designed in this course to furnish the teacher with a knowledge of the broader physiographical and anthropological principles, whose application is indispensable for the correct interpretation of the statistical and other data of contemporary commerce. It will be seen that this course forms a natural introduction to the study of economics, social science and history.

ILLINOIS

Eastern Illinois State Normal School, Charleston, June 19-July 28

1. Physiography—A study of land forms and the processes of their development. Work with topographic maps and field work. Miss Annie L. Weller.

2. The Geography of the North American Continent—The principles of Physiography and Meteorology are used as a basis of the course. Miss Annie L. Weller.

University of Chicago, Chicago

46. Field Geology (Third Course)—This contemplates thorough and systematic work in close conformity to official standards, and, as nearly as possible, individual and independent. The work of the course may form the basis for a doctor's thesis. Prerequisite: Course 20.

15A. Advanced Physiography; Geographic Geology—The origin, development, and destruction of physiographic features. Especially, the study of the physiographic effects of the atmosphere, rivers, waves, glaciers, vulcanism, and diastrophism. Prerequisite: Elementary Physiography and Elementary Geology. First Term; 10:30. Professor Salisbury.

19. The Teaching of Physiography—A course for teachers of Physiography, especially in secondary schools. An outline of the matter to be presented, and a discussion of the points to be emphasized, and of the methods of presentation. The place of laboratory and field work. Prerequisite: Physiography. First Term; 11:30. Professor Salisbury.

43. Special Geology—Individual work on selected themes for advanced students. First Term. Professor Salisbury.

20. Field Geology (Second Course)—Advanced field work, involving the systematic investigation of a formation or an area. A formal report, as nearly as practicable in conformity with the approved standards of official geological reports, is required. The fields for 1905 will be in the West, and in Wisconsin. The work may be prosecuted during the months of July, August, and September. One party, limited to twelve, under the leadership of Dr. Atwood, will spend the month of August in and about the Black Hills of South Dakota. This party will leave Chicago July 28. Other parties, doing more special work, will study the former glaciation of selected

mountain regions in the West, under the direction of Professor Salisbury, or the drift formations of eastern Wisconsin, under the supervision of Dr. Alden. In the last course the arrangements are individual, and the work may be done at any time during the summer. Each field course of four weeks with a satisfactory report thereon, gives a credit of 3M. Prerequisites: Courses 8 and 16. Second Term. Professor Salisbury, Dr. Atwood and Dr. Alden.

2A. Geologic History of Organisms—An elementary course in Historical Geology. The initiation and evolution of the various organic types; the consideration of the questions involved in geographic distribution and geologic range. Prerequisite: The elements of Physiography and Zoölogy. First Term; 2:30. Assistant Professor Weller.

*20A. Field Geology—In some selected field, not yet determined, the stratigraphic and structural features of sedimentary formations will be studied, with especial reference to the use of fossils in the interpretation of stratigraphy. Four weeks will be spent in the field. The preparation of maps and reports will complete the course. Prerequisites: Same as for Course 20 above. During September. Assistant Professor Weller.

8. Field Geology; First Course (outside of Chicago).—This course is intended to form an introduction to the more specialized professional courses that follow, and to furnish a basis for the teaching of Geography, Physiography, and elementary Geology. It involves training in stratigraphic, glacial, and other field determinations, together with mapping, sketching, and technical description. The field is the vicinity of the Devil's Lake and the Dells of the Wisconsin, in Wisconsin. Four weeks will be spent in the field, commencing June 19. The preparation of a report will complete the course. Prerequisite: First Term. Dr. Atwood.

1A. Physiography—The earth's features, treated with special reference to their origin and significance. Agencies affecting changes in geographic features; physiographic changes in progress; genetic geography. The course will have special reference to North America. Second Term: 2:30. Mr. Barrows.

8. Field Geology (repeated)—The field will be the region about the Dalles of the St. Croix, Wisconsin-Minnesota. The party will start from Chicago July 31. Second Term. Mr. R. T. Chamberlin.

7. Field and Laboratory Course—Study of the geography and geology of Chicago and vicinity, and of relief, topographic, and geologic maps. The course will include two field trips (one on Saturday) and three laboratory exercises (or lectures) weekly. For teachers, and for those who wish to

learn methods of field work. Prerequisite: Physiography. First Term; 1:30-3:30. Mr. Lees.

Students taking this course should take no other afternoon course.

Geography

30. Research Course in Physical Geography—Topics will be arranged with students individually, on conference with the instructor.

11. Economic Geography of North America—A study of the natural resources of the continent, as factors in its economic development. The geologic structure, the physiography, and the climate, treated as factors determining or affecting the location and utilization of mineral resources, arable and grazing lands, forests, etc. The influence of these various resources on the settlement and development of the continent. 8:00.

*1. Elementary Meteorology and Oceanography—An outline course for teachers of Physical Geography and Physiography. Second Term; 1:30. Mr. Barrows.

This course, with Geology 1A = Geology 1.

7. Influence of Geography on American History—A study of the geographic conditions which have influenced the course of American History. Their importance as compared with one another, and their importance as compared with non-geographic factors. Familiarity with the leading events of American History, and with the elements of the Physiography of the United States, is presupposed. Primarily for teachers of Geography and History. Second Term: 9:00. Mr. Barrows.

5. Commercial Geography for Teachers—The scope and method of Commercial Geography, its bibliography, text-books, and original sources. Special topics will be investigated. This course is designed for teachers, and is not an equivalent for the required Junior College course. 1:30. Assistant Professor Goode.

106. Fundamental Considerations in Teaching Geography—Development of the topography of type-forms. Elements of climate. Relation of life to geographic controls. Students are expected to take the special trips given in connection with this course. 11:30. Associate Professor Baber.

37. The History and Geography of the United States—This course will include observation in the University Elementary School. First Term; 8:00-10:00. Associate Professor Baber and Associate Professor Rice.

103. Geography of Eurasia—A study of the physical, climatic, and life conditions of the continent; relation to human occupation and industries. Second Term; 11:30. Associate Professor Baber.

164. Geographic Drawing and Chalk-Modeling--Blackboard sketching

of typical surface features; plains, valleys, mountains, glaciers, cañons, shore features, etc.; cross-sections and pictorial representations of large sections of continents, as plateaus, river basins, and mountain systems; chalk-modeled relief maps. The work will be done on paper as well as on the blackboard. First Term; 2:30. Repeated, 3:30. Mr. Thorne-Thomsen.

Anthropology

1. General Anthropology—Outlines of the science. Tylor, Anthropology. The class work will be based on the text-book named. 11:30. Associate Professor Starr.

15. The Pueblo Indians of New Mexico—The series of class lectures are directive to the literature. Students will investigate and report on special topics. 10:30. Assistant Professor Starr.

University of Illinois, Urbana, June 12-August 11

Physiography

S 1. Elements of Physical Geography—A laboratory course in physical geography. Gilbert and Brigham's Introduction will be used as a text, and selected topics taken from it will be made the basis of the term's work. The exercises will be mostly in the field. When conditions do not favor work in the field the time will be spent on problems in meteorology, climatology, weather prediction, and land sculpture, as illustrated by contour maps and lantern slides. Daily: (2½.) Mr. Fox.

S 2. Teacher's Course in Physical Geography—This course is designed primarily for those who expect to teach. The work includes discussions of the most approved methods of presenting each topic in class room, field, and laboratory, and the use which can be made of local geography, topography, and geology together with the fauna and flora as illustrative material. It also includes the selection of topographic sheets issued by the United States Geological Survey which show well developed topographic types, and their proper use in the class room; the manufacture and use of models and all other means by which the principles of the science may be experimentally studied. It further includes observations on character of clouds, direction and velocity of wind, temperature and humidity of the air, and their relation to weather changes; the study of weather maps, and the construction and use of simple apparatus for meteorological observations. A study is made of the geographic elements which have combined to produce the peculiarities of surface and climate of selected regions and the effect which these combinations have had on the historical, commercial and industrial progress of their inhabitants. Daily; (2½). Mr. Fox.

Required: An approved course in elementary physical geography, or Geology 8, as described in the catalog of the University.

INDIANA

Indiana State Normal School, Terre Haute, June 26-August 26

Geography

Charles R. Dryer, Head of Department. William A. McBeth, Assistant Professor.

Three courses in Geography will be given:

1. Physiography—The description and explanation of land forms. Examination of type forms in the field. Study of common minerals, rocks and soil, and interpretation of maps in the laboratory.

2. Meteorology—A study of the atmosphere, weather and climate. Principles of weather forecasting and construction and use of weather maps. Laboratory work and instrumental observation.

3. Physical and Political Geography of the United States—A study of the Physiographic regions of the United States in relation to the distribution of mineral, plant and animal products. Source, movement and growth of population. Manufactures, transportation and commerce. Location and development of cities. Map drawing on mathematical projections. A well equipped laboratory and an ample and carefully selected list of reference books facilitate the work in this department.

IOWA

Drake University, Des Moines, Iowa

Course 1. General Geography—The principal points of the field of Geography will be reviewed and current geographical questions will be discussed. In connection with this course will be a study of Physical Geography by excursions to neighboring regions. River valleys, flood plains, glacial deposits, rock stratification, etc., will be studied along the Des Moines and Raccoon river valleys. Visits to the coal mines, and the various industrial plants of Des Moines will be made under the direction of the professor in charge. Professor Nichle.

Course 2. Methods—This course will outline the work of the various grades showing the subject matter adapted to the work in each grade and the best manner of presenting it. The various text-books will be examined and everything that will contribute to the interest and value of work in Geography will be discussed. Professor Nichle.

KANSAS

University of Kansas, Lawrence

Course 9. Summer Field Work in Geology: conducted by Professor Erasmus Haworth. A course in field geology for the study of stratigraphy, geology, and economic products of the Carbonic formations of eastern Kansas, southwestern Missouri, and northern Indian Territory. Probably no other part of America affords a better or more complete section of the entire Carbonic than does Kansas and the Indian Territory, and certainly few equal this area for the production of lead and zinc ores, coal, oil and gas, clays, and suitable materials for the manufacture of Portland cement, all conveniently close together. Opportunity will be given for specialization in stratigraphic geology or in the economic geology of the area. As far as possible individual work will be encouraged. The party will form at Lawrence, June 8. Length of course, six weeks. Cost: Tuition for residents, $10; for non-residents, $20. Field expenses moderate, probably not exceeding $50. Apply to Professor Erasmus Haworth, Lawrence, Kansas.

MASSACHUSETTS

Harvard University, Cambridge

Course S 2. General Field Geology: conducted by Assistant Professor J. B. Woodworth. This course will devote five weeks to field work at selected localities in southwestern Montana. The region to be visited affords numerous extended sections of the geological column, with a great variety of mountain structures and of topographical forms. Practical instruction will be given in the identification of formations by means of fossils, and in the preparation of maps, sections, and reports. The party will leave Bozeman, Montana, on July 10, and camp at various points in the region studied. Members of this course should have already gained an elementary knowledge of geology. Decision to join the excursion should reach the instructor not later than June 20. The fee for the course is $20, payable in advance to Mr. Charles F. Mason, Bursar, Cambridge, Mass.

The income of the Josiah Dwight Whitney Scholarship fund, yielding two scholarships of $100 each, is available for members of this course, whether they are regularly enrolled as students of Harvard University or not. Applications with testimonials should be received not later than May 25, by Professor W. M. Davis, Cambridge, Mass., from whom a circular giving fuller information may be obtained.

Course S 3. Advanced Field Work—Training in field research, and in the methods of professional geological field work. Professor Shaler and

Assistant Professor Woodworth. Advanced students may be furnished opportunity for independent work, with a view to the publication of their results. Students who complete S 2, and manifest an ability for independent field work, may continue work in the Rocky Mountains under the direction of Professor Shaler and Assistant Professor Woodworth. This course may be counted as a whole course for the bachelor's degree by those students who fulfil the conditions set forth on page 8 of the Harvard Summer School Announcement, and devote not less than ten weeks to the course.

Course S 3*a*. Geological and Geographical Exploration in Iceland: conducted by Assistant Professor T. A. Jaggar, Jr. This excursion will start about June 15, and proceed via Edinburgh, Scotland, to Reykjavik, Iceland, arriving there about July 1. Four weeks will be spent in the study of volcanoes, glaciers, and geysers, and a tour around the island will be made by steamer. A limited number of students (men only) may join the party. Advanced students may undertake the study of special problems. Further information may be obtained by addressing Professor T. A. Jaggar, Jr., Cambridge, Mass.

MICHIGAN

Michigan State Normal College, Ypsilanti, June 26-August 4

General Geography of the Continents—Four hours weekly. A course of lectures will take up the physical features that seem to exercise most evident control on the distribution of man, and the social and political reactions of men to the control. An examination will be offered to those who wish credit in this course. 11 a. m. Professor Jefferson.

Field Geography—Teachers' half-course, four times weekly. Saturdays a half day and three other days from 2 to 4 p. m. There are two aims in this work: 1, to help teachers to recognize the geographic features of the landscape, and 2, to plan the use of these out-door forms in teaching with a text-book. Professor Jefferson.

Advanced Geography—Teachers' half-course, four hours a week. Preparation by students under the direction of material and plans for intensive lessons on the geography of Russia, Germany, France, Great Britain and some other countries with constant comparison and reference to the United States. Room 18, 10 to 11 a. m. Applicants for this course should have some previous training in geography. Professor Jefferson and Miss Lockwood.

Geographic Excursions—On Wednesdays, 7-9, Miss Lockwood will conduct walks about Ypsilanti, visiting picturesque spots about the city, and pointing out especially the history of the landscape and those geographical processes that commonly pass unnoticed, with the object of illustrating the possibilities of out-of-door work with public school classes. On Saturdays longer excursions will be made, some of them on the Detroit river to the Lakes. These will offer the best of opportunities for geographic study at very moderate cost, and under agreeable conditions. These excursions will be open to all students of the Summer School, whether enrolled in a class in geography or not. They will be planned consecutively, each in a measure preparing for the next, and will illustrate the work in geographic courses, but students who wish to accompany single excursions may do so.

MINNESOTA

University of Minnesota

Two courses in geology will be offered at the Minnesota Seaside Station on the Pacific coast near Port Renfrew, Vancouver Island, during the six weeks from July 8 to August 18, 1905, Professor C. W. Hall in charge.

Course 1. District Geology—For teachers and students. This course will comprise a study of the influence of the atmosphere; water dynamics—streams, waves, tides, and currents in their destructive and reconstructive effects; sedimentation and the structural and textural features of stratified rocks; volcanic activities and rock alteration. The special work from day to day will be determined by local conditions and individual needs. Excursions are to form a prominent feature of this course.

Course 2. Problems in Geology—For advanced students. Problems will be selected by the advanced students and prosecuted under such supervision as is necessary. This will be a course in field and research work. Exceptional opportunities are offered for field work connected with the collection of petrographic material and for physiographic geology. Daily programme: The Station day extends from 8 to 12 a. m. and from 2 to 6 p. m. The programme for field work will meet the wants of the students. Lecture rooms are available and the material is immediately at hand. On the return trip it is expected that a week will be spent among the glaciers of the Canadian Rockies. A day's excursion will be made to the trilobite beds of Mount Stephen. The entire expense from Minneapolis, including tuition, station privileges and travel, covering almost eight weeks, can be kept within $166; if only four weeks be spent at the station, $25 less than that figure.

MISSOURI

University of Missouri, Columbia

2a. Physiography—A course of study in the principles of physiography as illustrated in the physical features of North America. The subject will be taken up from the point of view of the needs of the high school teacher of Physiography, and will include the subject-matter as well as the equipment necessary for presenting it. The work will consist of laboratory and field work with occasional lectures and conferences. Six times a week; (3).

6a. Physical Geography—This is a course of study in general physical geography, covering the ground of the average high grade text-book. It will be presented as a lecture, library, and laboratory course and may be taken as a preparation for more advanced geographic work or for teaching the subject in high schools. Six times a week; (3).

NEW YORK

Columbia University, New York City

Geography

s3a. Geography of North America—Lectures and collateral reading. Miss Kirchwey. 9:30, A topical outline, illustrated by maps, models, and photographs, of the geography of North America, indicating the causal relation between the physical and life conditions. Designed for teachers in the intermediate and upper grammar grades; planned to show, through the study of North America, how each of the continents may be treated. Training in the use of reference books, and organization of subject-matter, by special papers. Topics: the position of the continent in latitude and longitude, in the wind systems, in reference to the oceans, and the effects of each; distribution of the surface features; the coast line; relation to other continents and the historic importance thereof; the position of the United States. Each physical division of the United States will then be considered as to political extent, surface, climate, soils, water supply, economic resources, and life conditions. The relation between geography and history will be emphasized whenever possible. Herbertson *Man and His Work,* Dodge, *Advanced Geography,* and Brigham, *Geographic Influences in American History,* will be the leading texts, though reference will be made constantly to Semple, *American History and its Geographic Conditions,* and Trotter, *Geography of Commerce.*

s32a. The Teaching of Geography—Lectures, conferences, and library work. Miss Kirchwey. 10:30. A consideration of the course of study in geography for elementary schools and of the general principles underlying good geography teaching. Work will be made as practical as possible with much discussion of the best method of presenting to the children the difficult problems met in the various grades. Each student will outline some special topics, adapted to the grade or grades of interest to him. Class criticism and discussion of these topics, outlined as lesson plans suited to certain grades. Especial attention to ways of teaching the present course of study in the New York City schools. Redway, *New Basis of Geography,* McMurry, *Special Method in Geography, The Course of Study in Geography in the Horace Mann Schools,* and Dodge, *Elementary and Advanced Geographies* will be the leading texts.

Geology

s1a. General Geology—Dynamic, structural, and physiographic. 1½ points. Dr. Berkey and Mr. Gordon. 11:30. Lectures will be given on the principles of physical geology, including the constituents of the earth; the work of the atmosphere, water and ice; the development of erosional topography; igneous agencies and their effect; and orogenic and epeirogenic disturbances. Special instruction will be given in methods employed in field work, the making of geologic maps, and interpretation of structural relations, with practice and applications in the field about New York. The course will be illustrated by a collection of typical rocks, topographic and geologic maps, and structural models. Short field excursions will be a regular feature. Text-books and references: Dana, *Manual of Geology;* Geikie, *Text-Book of Geology;* Scott, *Introduction to Geology;* Kemp, *Handbook of Rocks;* Chamberlin and Salisbury, *Geology I.* At the close of the session a three-day excursion (optional) to Kingston, N. Y., may be made if a sufficient number desire to go. The structure is complicated and extremely instructive, illustrating many of the principles discussed in the course. Fossils are numerous and practice in discriminating horizons will be given. Total expense not over $12. Open to all students in any of the courses in Geology.

s4. Petrography—Dr. Berkey and Mr. Gordon. 9:30-11:20. This course includes lectures on the principles and methods of rock study by means of the petrographic microscope; a discussion of rock classification; description of the chief groups; and instruction as to interpretation of the structures and textures seen in them. There will be systematic laboratory study of the chief types of rocks, both in hand specimen and thin section, and practice in identification and formal description. The facilities for laboratory work are very complete and if desired arrangements can be made for extra time. A knowledge of the elements of mineralogy is assumed. Text-books: Harker, *Petrology;* Reinisch, *Petrographisches Praktikum, I and II;* Kemp, *Handbook of Rocks.* Equivalent to Geology 4, Columbia University.

s3a. Economic Geology—Dr. Berkey and Mr. Gordon. 1:30. Lectures will be given on the occurrence and origin of the ores of the metals, the characteristics of ore bodies, and relationship to geologic structure. The leading districts and chief types of deposits will be described and their ores exhibited. The facilities for examination of representative material and for systematic reference reading are very complete so that extra time may be devoted by the student as desired. Reference books: Tarr, *Economic Geology of the United States;* Kemp, *Ore Deposits of the United States;* and economic papers of the Geological Surveys. It is planned to continue this subject in a more advanced course (s1*b*), next year, the two courses being counted equivalent to Geology 3, Columbia University.

Palaeozoic Stratigraphy of New York State—Conducted by Professor A. W. Grabau. Three weeks of field work at important localities in New York (and possibly in neighboring points of Pennsylvania and Ohio), covering the formations from the Potsdam Sandstone to the Coal Measures. This course is open only to those who have already studied stratigraphy to some extent. It may be taken by graduate women students. The party will leave New York City about May 25. The field expenses will be about $75. The fee for students not already registered in Columbia University will be $20, $5 of which covers the registration fee. For further information, address Professor A. W. Grabau, Columbia University, New York, N. Y.

Cornell University, Ithaca, July 5-August 16

Geography

A. Home Geography—A systematic statement of the chief phases of Home Geography with numerous illustrations. Excursions to fields, shops, factories and local industries will be treated at length. The mode of handling such excursions with classes of children is discussed. The relation of this excursion work in Home Geography to later studies is traced out. It is expected that a number of these local excursions can be taken to suitable places in and about Ithaca. Geologic Lecture Room. T., Th., 10. Professor McMurry.

B. Type Studies of North America—The course of study on North America is worked out in a series of important types suitable for the instruction of children in the grades. Around these types as centers the important facts are organized. A number of these type studies are given a full treatment so as to illustrate the value of types and the principles of method in class instruction. The general movement through the grades is planned and the relation of these topics to earlier and later studies illustrated. Geologic Lecture Room. M., W., F., 9. Professor McMurry.

C. Type Studies of Europe—Europe as the second chief center of geographic study is treated in a series of chief topics or types, with incidental review of previous studies on North America. The movement from Europe to the other continents is discussed at length. In combination with the previous course this will give a full survey of the whole elementary course in geography. Geologic Lecture Room. T., Th., 9. Professor McMurry.

D. Aims and Problems in Geography—Designed more particularly for Grammar School teachers. The course consists of lectures, discussions, and exercises dealing with the actual problems of the class room. Some of the topics treated are: the chief aims in teaching geography; the relative value of different kinds of geographical knowledge; methods of conducting the recitation; the proper use of the text book; the use and misuse of supplementary books; map modeling, map drawing, and the use of outline maps; use of pictures; field and factory trips; simple laboratory exercises; simple methods of teaching the earth's movements, the tides, etc. Course J is recommended, though not necessary, to accompany this course. Geologic Lecture Room. T., Th., 11. Supervisor Whitbeck.

E. Geographic Influences and Relations—Lectures and studies designed to show the influence of physiographic and climatic conditions upon human activities: the influence of soil, coast line, mountains and valleys, plains and plateaus, gaps and passes, winds, rainfall, ocean currents, altitude and latitude, navigable inland waters; geographical causes leading to the location and growth of cities, the location and migration of industries; man's reaction upon his environment and his conquest of natural obstacles. Geologic Lecture Room. M., W., F., 11. Supervisor Whitbeck.

F. Physical Geography—A lecture course upon modern physical geography, including the lands, the seas, and the atmosphere. The development and systematic classification of the leading physiographic features will form the basis of the course. Some of the topics discussed are: rivers, plains and plateaus, shore-lines, mountains, volcanoes, glaciers and the glacial period; the ocean, its composition, movements and work; the atmosphere, general circulation, cyclones and special storms. The lectures will be fully illustrated by lantern slides. Students electing this course are advised to take also the two related courses, G and H. Geologic Lecture Room. M., T., W., Th., 8. Mr. Hubbard.

G. Laboratory Course in Physical Geography—This course includes both subject matter and methods. Although the course is arranged primarily for teachers in high schools, yet it is so planned as to be of advantage to grade teachers who anticipate teaching geography in the high school. The laboratory equipment used in the course consists of numerous models, charts and maps; much attention, however, is given to the possibilities open to teachers in schools having limited laboratory equipment. So far as possible the work offered will be arranged to meet the individual needs of teachers; where desired by a teacher, personal suggestions will be made regarding the local field work he may carry on with his classes. Among the specific topics treated are the following: the interpretation and use of topographic maps; study of topographic maps and models illustrating type land forms; the assembling and mounting of topographic sheets into useful type maps; physiographic influences; the use of photographs; common rocks; weather maps. Physical Geography Laboratory. T., Th., 2-4. Mr. Hubbard.

H. Field Course in Physical Geography—One afternoon each week and two Saturday all-day excursions are devoted to the study of physiographic phenomena in the field. In this field work a study is made of river valley forms, both young and mature; waterfalls; lakes; and typical glacial deposits, including moraines, drumlins, kames, eskers, and overwash plains. Monday afternoon. Mr. Hubbard and Supervisor Whitbeck.

I. Round Table Conference in Geography—There will be several evening conferences for instructors and students in geography, at which discussions of important general topics in connection with geography will take place. Some topics discussed in previous years were Nature and Scope of Geography, Principles Determining the Course of Study in Geography, Excursions and Laboratory Work in Geography, Sources of Geographic Knowledge. Attendance on this course is purely voluntary and cannot be counted for University credit; but such free interchange of views among teachers and students is expected to throw much light on problems of teaching and on working methods.

J. Elementary Earth Science—Six field trips; matter and method will both receive consideration; suitable for grammar and high school teachers. (See also Nature Study, p. 28.) (1) How the soil is made; its differences and qualities. (2) The work of the smaller streams. (3) The work of the larger streams. (4) The story of the rocks; collection of specimens. (5) The stories the pebbles tell; collection of types. (6) Some changes wrought by the great glaciers. Friday afternoon, 2-4:30. Supervisor Whitbeck.

New York University, New York City, July 6-August 16

S23. Methods in Geography—The first step in this course will be the consideration of the three fundamental propositions involved in method in geography: (a) The nature of the mind so far as it has a direct bearing upon the organization of the subject-matter and the method of teaching geography. (b) The nature of geography. (c) The purpose of education. The second step will be the organization of a course of study in geography for the grades that will harmonize with the nature of the growing mind and the nature of geography, and that will serve as one of the instruments by which the purpose of education is to be realized. The course of reading connected with this work is intended to acquaint the student with the literature of the subject, and to make him familiar with the sources of geographical information. Professor Mitchell.

S1. Physiography—The purpose of this course is to give as comprehensive a view of the science of Physical Geography as the limited time will permit. The scope of the work will include such topics as: The earth sphere—its significance and what it means to teach it; the hemispheres—how determined and their geographical significance; the atmosphere, including its general circulation and weather forecasting; the effect of atmospheric movements upon the distribution of plant, animal, and human life; the gross structure of the continental masses, and the geographical significance of such structure, etc. The work will consist of lectures and informal conferences on the various phases of this branch of study. This course will be especially helpful to teachers of geography, and especially so to those that are teaching the subject of physical geography in the High School. Students intending to take this course should bring with them such text-books on Geology, Physiography, Meteorology, Physics and Physical Geography as they may happen to have. Professor Mitchell.

NORTH CAROLINA

University of North Carolina, Chapel Hill

Course 13. Advanced Course in Field Geology—Professor Collier Cobb in charge. An advanced course in field geology for students who have already completed an elementary course will begin at Chapel Hill, on July 3, and last five weeks. The class will study the Triassic beds and their lavas in a series of excursions from Chapel Hill. Short excursions from Cumnock and Sanford will be made to deposits of the Lafayette and Columbia formations. The party will return by the eastern border of the Triassic area, seeing the crystalline schists near Raleigh and the older volcanic rocks near Cary. The work will include geological mapping and the preparation of a detailed report. The field expenses will not exceed $50. The tuition fee will be $20, payable in advance to W. T. Patterson, Bursar, Chapel Hill, N. C. For further information, address Professor Collier Cobb, Chapel Hill, N. C.

WISCONSIN

9. Field Petrology—The aim of this course is to afford the student so much of a knowledge of rocks as is essential to their study in the field in connection with the preparation of geological maps. No previous knowledge of mineralogy is required, though such knowledge confers special advantages. The large rock collection stored in the department (see Geological and Mineralogical Museums) are drawn upon for illustrative material. Several short and one or more longer excursions will be included in the course. M., Tu., W., Th., F. Two-fifths credit.

3. Field Geology—This course is identical with course 3, as given in the regular University year. It is open to students who have had general and historical geology equivalent to courses 1 and 2, described in the annual catalogue. Students work in parties of two. An area near Madison is assigned to each party. The students make their own topographic maps by the use of plane table, alidade and barometer. With this topographic map as a base, each student prepares a geological map and a written report on his area. A brief introductory explanation of methods is given, after which the instructor divides his time among the parties in the field. The work of the course occupies about one-half of each day, for five days in the week, thus leaving Saturdays open for the longer class excursions, accompanied by the instructor. The area covered by the detailed studies is within the glaciated region, but near its margin, and contains good types of the styles of topography of glacial origin. The scenery and geological processes of lakes are especially well shown. Rocks of the older Paleozoic are exposed in cliffs, ravines, railroad cuts, quarries, etc. An all-day trip by wagon is made to the driftless area, others by rail to Blue Mounds, Devil's Lake, the Baraboo Ranges, the Dells of the Wisconsin River and probably to other points of combined geologic and scenic interest. Those contemplating taking this course should correspond with the instructor, stating what previous work they have had in Geology. Two-fifths or three-fifths credit according to work done.

Class Excursions—It is understood that Saturdays will be held open for longer excursions by students in courses 3 and 9. Most of the trips are made in the vicinity of Madison, which affords excellent illustrations of physiographic development and the operation of geological equats. Students in course 7 will be welcomed in these excursions.

A CLASSIFICATION OF RIVERS BASED ON WATER SUPPLY[1]

BY ISAIAH BOWMAN
Cambridge, Mass.

IN the present-day teaching of geography great emphasis is placed on the close relation between the physical controls of the Nile River in Egypt, and the responses in the life of the Nile valley which those controls evoke. This vital relation between the river and the life along its banks has for centuries been an absorbing theme in geography. The contrast between the sterile desert, with its sand dunes and rocky ledges, and the river flanked by strips of garden-farms with patient tenants, appeals to that universal interest in a unique human struggle.

But the great human interest which many geographic problems arouse often results in the failure to recognize, at least in practice, those principles, in the light of which all the facts of our subject should be viewed. Geography as a science eagerly includes the Nile with all its attractive features, but it goes farther and recognizes it as one of many rivers which exhibit similar characteristics, and contrasts it with still other rivers which exhibit different characteristics: it regards the Nile as a striking illustration of a type of stream of which there are numerous other examples scarcely less interesting. The systematic treatment of geographic details does not destroy, it sustains and broadens the interest, insures a more thorough understanding of the individual thing, because it appears in relation to its fellows, and makes geography a unit and a science, not a collection of interesting facts.

It is because of this systematic treatment of data relative to the periodic rise and fall of streams, as given in a chapter of Woeikof's "Die Klimate der Erde," that the following translation of the most useful and interesting part of the chapter is presented. Woeikof's is apparently the only attempt which has been made to present the data in this manner. Both Reclus and Günther treat the rise and fall of a few streams besides and including the Nile, but neither emphasizes the generality of the process. Additional interest attaches to the classification, in that it was first printed in Russian in 1884, in the first edition of Woeikof's work.

It is hoped later to present the above and other similar data in closer conformity to the genetic as well as the evolutionary idea, but for the present the mere translation is given.

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[1] The writer's attention was first called to Woeikof's thesis by Professor R. DeC. Ward in the course in General Climatology, Harvard University, to whom thanks are due for generous assistance in the revision of the translation.

"Springs, brooks and rivers are a consequence of atmospheric precipitation; they carry to the oceans and to those lakes without outlet the water which remains after evaporation from the surface and absorption by the ground and by vegetation have played their part; and from these great basins evaporation is again effective before the waters begin their circulation anew. Being the result of precipitation, streams must reflect the periodicity characteristic of precipitation, and it is possible to establish types of streams expressing the quantity, character and periodicity of the precipitation. A few cautions which will prevent error should be observed, especially in those continents in which the run-off has not been measured very accurately.

(1) In considering the amount of water in rivers, it is easy to consider lowlands, especially near the mouths of streams, as moister than they really are, since with a gentle slope there is more water in evidence than in the case of a steeper slope. At times of high water rivers inundate such areas, often miles in width. On the other hand, where streams run through a rocky country each increase of water-supply is manifested by a marked rise of water. It is easily possible, therefore, that we should come to a false idea of the importance of the cause from the examination of tables showing the height of water in streams within narrow confines.

(2) A large stream expresses in its run-off an average of the climatological influences which operate over its entire basin, and, as is the case with every average, it is interesting to resolve it into its component parts. Small streams give a truer idea of climatological influences, since in small regions the climate has less opportunity to vary.

(3) The distance of a given point from the upper part of a river basin and the velocity of the current must be kept in view if any conclusion regarding precipitation is to be drawn from the flow or rise of streams. In large streams the delay is very noticeable. For example, at Astrakan the Volga attains its highest stage in June, about two months after the snow has melted in the upper basin of the Volga and Kama. High water in the Nile, the result of the Monsoon rains in 5°-15° N. latitude approximately, reaches Egypt in September, two months after the greatest rainfall.

(4) The penetrability of the soil and of rocks must be taken into careful consideration. The more penetrable the earth the longer time will elapse before rivers are filled after a given storm. In this manner Belgrand, *e. g.*, through his striking investigations in the Seine valley, predicted the time of high water and of maximum rise in Paris with complete accuracy. When the winter temperature is significantly below 32° F., the ground is still

frozen at the time the snow is melting in the spring; and even though the surface is ever so porous, it becomes impermeable because of this condition. Water resulting from the melting of snow runs off more quickly therefore than rain water.

(5) Care must be exercised in the consideration of evaporation which becomes more rapid as the air becomes dryer and warmer. For this reason the rains of summer have less influence on the rise of streams than those of colder seasons, and more especially at the time when snow is melting. Hence the rivers of Europe have high water so seldom in summer, even in regions where summer rains prevail. (Mountain are the only exception in this case.) Belgrand was even of the opinion that summer rains could not produce high water. This is quite right for the Seine basin, but the statement is not borne out in some other localities. In warm regions, where from twenty to forty centimeters of rain falls in a single month, as in the case in many regions where tropical or monsoon rains occur, the streams rise very rapidly, no matter how much water evaporates from the ground or from vegetation.

(6) Lakes have a great influence on the height of water in their outlets. They serve as regulators of the height of water and, when of sufficient size, they may even conceal the yearly periodicity of the rise of water. I shall name such streams: lake streams. In the largest of European lake streams, the Neva, there is really no change in the water level observable as depending upon the inflow of rain and snow water. Highest water comes in December, the least in May and depends on the winds. Inundations do not occur in St. Petersburg soon after the melting of snow, while they are common in the rest of Russia and commonly attain a maximum in the autumn, when the strong and persistent west winds dam up the water. The farther from a lake a stream is, the greater the number of tributaries it receives, the more its régime changes, and the nearer it approaches that of other streams of the same region. In this manner, the Rhone, which is a true lake river, from Lake Geneva to Lyons, has but slow and insignificant changes of level. The Saone influences the Rhone significantly, and the farther towards the mouth, the more rapid and great become the changes in levels, at least as far as the delta, since the Rhone is joined here by mountain streams which are controlled by extremely high water.

The following types of streams may be recognized:

(A) Streams which receive their supply of water from melting snows in flat regions, or in moderate elevations up to about three thousand feet in height.

This type is nowhere ideally represented but in a few regions the streams receive the greater part of their water from the melting of snow. Examples are the streams of Siberia and of northern North America, and of the North American archipelago, where the snow lies on the ground from eight to ten months of the year.

(B) Streams which derive their water from melting snows in mountains.

This, like the former, occurs nowhere as a pure type, but there are regions in which the streams receive all but an insignificant share of their water from this source. Such are the streams which encircle the western part of the massif of central Asia. The Amu- and Syr-daria, the Tarim and the upper Indus belong to this type. In their lower reaches they flow through regions in which but little rain falls, and if in their middle courses some rain falls, it occurs almost exclusively in winter. In such cases high water is the result of the melting of the snow on the mountains, and as the temperature changes are pretty regular, the occurrence of high water is also regular, while the maximum height is dependent upon the amount of snow that has fallen during the winter. The water in such rivers becomes of great value for irrigation, without which the middle and lower portions of their courses, which run through dry areas, would be quite uncultivable. Streams which derive their water from melting snows in mountains are particularly valuable, inasmuch as the rise of water is regular and occurs when vegetation is most in need of irrigation.

(C) The streams which derive their water from rainfall and have highest water in the warm season of the year.

This type depends on tropical and monsoon rains. It is most clearly typified in some large river systems—for example, in the Orinoco and Congo, over which no snow ever falls. In winter, which is usually the dryest season of the year, the streams are low and are fed principally through the supply of springs; while in summer the supply of rain is so copious that, in spite of great evaporation and in spite of the great amount of water which is held back in the great forests and swamps, enough remains to cause a regular yearly rise of water in the streams.

Some tropical streams, such as the Amazon, also receive some water from melting snow in the mountains; but this is inconsiderable, for the snow covered areas are very small because they do not occur except at an elevation of more than twelve thousand feet. Extensive areas of such heights are rare in the tropics. (Southern Peru and Bolivia are approximately this height, but they are dry.) The result is, since the temperature changes are not great throughout the year, that there is no season of the year in which large areas of snow melt at the same time; besides, most of the snow falls at the time that the rains fall. As the addition of snow water is neither large nor limited to a certain time of the year, there can be no high water in the streams as a result of this cause.

The Nile belongs to this type. It receives its high water from the monsoon rains which fall in summer, and between latitude 5°-15° N. The Ganges and the Brahmapootra are also of this type principally, but they receive part of their water from the melting snows in the Himalayas and in the mountains and plateaus of Thibet. The large streams of China belong also to this class; that is, they have low water in winter, and high water, which is derived from the monsoon rains, in summer and in the beginning of autumn. In Hanchou, in the middle course of the Yang tse Kiang the water rises regularly in summer, sometimes rising nearly 50 feet above its winter level, and the whole surrounding plain is inundated. This cannot be derived from melting snows in the mountains, for in the highest parts of the mountains to the west but little snow ever falls. (Prschewalski found no continuous snow cover in the plateau of Thibet at an altitude of over 15,000 feet in winter with temperatures extremely low.)

It is noteworthy that the Amu- and Syr-daria, which head in the western part of the central massif of Asia, and the Chinese streams which rise from the east of the same massif have their high water at the same time, namely, in summer, notwithstanding the periods of precipitation occur in exactly opposite seasons of the year—in the former, in winter; in the latter, in summer. In the former the precipitation is in the form of snow in the mountains; in the latter, as monsoon rains in the flat regions. For this reason the rise of water occurs in both of them at the same time of the year. The Amur, and also its tributaries, have no regular time of high water in spring, though one might reasonably expect a rise after the severe winter. This is explained by the light snow-fall of winter, except near the mouth of the stream. As summer advances however the Amur and its tributaries often experience a significant rise, and devastating floods have occurred here. The first Russian settlers suffered greatly from these floods before they became adjusted to the climate; for example, they had previously left their hay out in the meadows, as is the custom in Russia, but here, in the high water of summer, it floated away. As the mountains are not sufficiently high to retain snow until August, the high water is naturally a product of rainfall. High water which occurs because of the melting of snow, is apt to be more regular than otherwise. A similar regime obtains in the Baikal region: The Selenga has no high wa [illegible] but often rises in the summer because of rain. In centr [illegible] ighing is seldom possible, although the average temperature of the three winter months is about five degrees below zero F.

Even the infrequent overflows of Lake Baikal come in years of particularly heavy rainfall, for example, on the occasion of the one in the year 1869, as Orlow has clearly shown.

The régime of the Chinese rivers, as well as those of Manchuria and the lands near the Amur, demonstrates the extension of the monsoon climate much farther north and west than was formerly supposed, a fact first asserted by me (Zeitschr. f. Met. Bd. V. S. 39). When the rivers are at the high water stage following the summer rains and are low in spring and winter, the meteorology must be of a very distinct monsoon type, for, with an insignificant excess of summer rainfall, the rivers would still be low on account of the rapidly increasing evaporation in the warm season.

West of Lake Baikal there occurs the following type:

(D) The rivers which get a large part of their supply from rains, but where high water is the result of snow-melting.

Although in the greater part of the region in which this type belongs, summer precipitation predominates, the rainfall is usually much lighter than in the tropics or in the region of monsoon rains, and, on account of great evaporation, these rains are not generally followed by high water in the streams. The melting of the snow, on the other hand, furnishes a great deal of water at once, and since the ground is then frozen, the water reaches the streams very quickly, frozen ground being impenetrable to water. Moreover, evaporation is not as great during and after the time of the melting of snow, as in summer. The foregoing makes it clear why high water should systematically follow the melting of the snow and why the water should be higher than at any other time of the year, even though but a fifth or a sixth of the precipitation is in the form of snow. High water following the melting of snow over lowlands and hilly countries is an impressive sight on account of its great geographical extent, and also because of the regularity in the time and maximum height of the rise. There is great contrast between the rivers on the plains of eastern Europe, with their regular spring rise, and those of western Europe, where the periodicity almost disappears, although this certainly does not exclude occasional overflows. To this type belong most of the rivers of northern and western Siberia, although the farther north one goes, the nearer the streams approach type (A). To this type also belong most of the rivers of European Russia, those of Scandinavia, eastern Germany, northeastern United States, and some of the streams of the northern part of North America, where, as in Siberia, the farther north one goes the nearer they approach type (A). Over the greater part of European Russia precipitation in the form of snow, measured as water, amounts to from four-tenths to eight-tenths of an inch per annum, or about from one-third to one-sixth of the annual precipitation; in the southern part the snowfall is, of course, much less. In the European-Asiatic part of the region under discussion, the average rainfall of each of the summer months is not over four-tenths of an inch, in the rainiest months about one inch. (Such an abundance of rain as the latter number indicates is largely local.) For this reason the influence upon the streams is insignificant. Only the mountain streams rise oftener in summer on account of the greater precipitation and their steeper descent. In the southern hemisphere, Type D is missing, since in the only continent which extends into higher latitude, South America, the winters are so mild that a snow cover cannot have long duration.

(E) Those streams which derive their water from rainfall, which flow regularly and which are higher in the coldest part of the year, but where the regular yearly change is insignificant.

This type dominates in central and western Europe; also, with some modifications, in the eastern part of the United States. It also exists on the western watershed of North America, north of 45° N. latitude; and in South America, south of 45° S. latitude. Similarly in New Zealand; but in these regions there appears an approach to Type B (snow melting in the mountains). This type partakes of the characteristics of Type D. The precipitation which occurs in the colder months is not everywhere dominant but it fills the streams the more because it occurs at the time of diminished evaporation. The streams of this type are best known; for example, many streams of Germany and England, the Mississippi, and particularly the Seine.

Although periodic changes in the height of the water are insignificant in these districts, floods are not infrequent, even far from the mountains, where there is the greatest danger. In calling attention to the valuable investigations of Wex, I wish to remark that deforestation of mountains and hill countries allows the water to run off too freely, and the dikes in lowlands again serve to confine the water within bounds. In so far as a stream derives its water from high mountains it inclines toward Type B. Such is the Rhine, which has its high water in summer because of the melting of the snow and glacier ice in the Alps even beyond Strassburg. But farther north Type E begins to dominate and at Cologne the maximum height of water occurs regularly in winter. In the uniform lowlands of northern Europe it is hard to discriminate sharply between Types D and E. One is in doubt whether to classify the Elbe and Oder under Type D or E, since the winter snow cover is not regularly existent in their basins although it is frequent enough. The Vistula belongs to Type D, but with a mixture of Type B. The Danube occupies a very doubtful position. The lowlands belong to Type E; the Bavarian plateaus and the lower foothills of the Carpathians in Hungary and Wallachia to Type D; the Alpine regions to Type B. The Mississippi also occupies a doubtful position. The upper part of the basin is under the influence of the melting snows and the resulting high water occasionally meets in its descent to the lower part of the stream's course the high water from the Ohio and the Red, etc., which is the result of the spring rains. The tributaries which rise in the Rockies would give in summer much water from melting snow if the eastern slopes of the mountains were covered with abundant snow, which is not however the case.

(F) Rivers which derive their water from rain, are much higher in the colder parts of the year, and, in fact, exhibit a great difference between regular high and low water, while in summer some of these streams even dry up.

This type dominates in southern Europe. It is allied with the so-called tropical rains, *i. e.,* with a small amount of or even no rain in summer. When the summer—that is, the time of greatest evaporation—is so dry, the rivers have but very little water, except as they are supplied through the melting of snow in the mountains. In the winter, however, or in the spring and autumn, there is more water and because of the violence of the rains and the lack of forests, devastating floods are common. Who has not heard of the floods of the Arno and Tiber in Italy, the Loire, Rhone and Garonne in France, or in the province of Murcia in Spain? In France these misfortunes have led to the reforestation and turfing of the mountains, results comparable geographically to those exhibited in Venice. The greater part of Europe belongs to Type F with a partial mixture of Type B (snow-melting in mountains); the more rainy parts of central Asia and Persia (as also Fergana, Aderbeidschan); a large part of Asia Minor and Syria, north Africa from Tunis to Morocco, California, Oregon, Chile, northern New Zealand, and southern and western Australia.

(G) Deficiency of brooks and rivers on account of the dryness of the climate.

It is highly probable that no place on the earth is wholly without precipitation, but there are many in which precipitation is so scanty and irregular that no brooks and rivers are possible, at least no constant streams are possible. In such a region temporary brooks and rivers are formed after rain or the melting of snow, which either form pools and lakes that evaporate quickly, or which are soon lost in the sands.' Occasionally such a region is traversed by streams which have their sources in rainy areas and which receive no tributaries throughout the extent of the dry area, but, on the contrary, lose much water through evaporation. Examples are: the Nile, from 17° north latitude to its mouth; the Indus, below the mouth of the Satledsch; the Colorado, from 35° north latitude to the mouth of the Gila; the Volga, from Sarepta to its mouth. To the regions without rivers belong: the Sahara, part of Arabia, and the Aralo-Caspian depression, a large part of the lowermost inner plateau of Asia, large parts of the North American plateau eastward and also especially westward of the Rocky Mountains, the desert of Atacama and the desert region of South America between 18° and 30° south latitude, the Kalahari desert and neighboring desert areas of southern Africa, and lastly, a part of the interior of Australia. Mountains in deserts are generally an exception. Even in the Sahara there is a constant flow of water in the mountains.

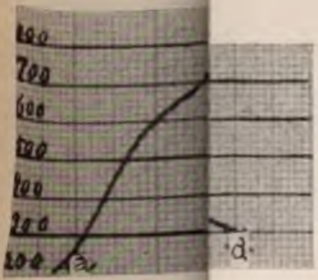
A transition toward Type G is represented in places which have flowing water only in certain times of the year, and even then the quantity is not large. I shall designate this type with the capital letter H. The time is naturally during and after rain, and in climates with cold winters, during and after the melting of snow. Examples are: northern Crimea (in so far as it is not traversed by streams which rise in the mountains), a part of the Kirghis Steppes and the plateau lands of inner Asia, the steppes near the lower sources of the Kura and the Araxes, a belt south of the Sahara between 13° and 18° north latitude, and varying according to the longitude, where in summer the monsoon rains do fall, but are of too short a duration to result in constant streams, and finally, a number of regions in North and South America, and particularly in Australia.

Finally there are extensive regions without streams, but these are lacking through the operation of a wholly different cause than those discussed heretofore, that is, a more or less complete covering of snow and glacial ice. In this case the streams are replaced by the glaciers, which together with glacial streams, carry to the sea or to lower and warmer regions the excess of precipitation over evaporation. These I shall designate as Type I.

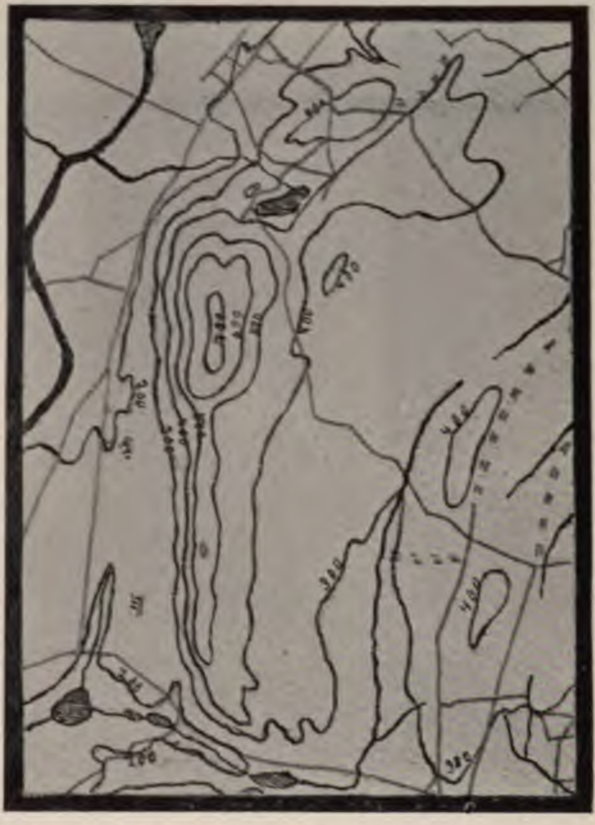
The latter condition occurs in a region of snow and ice covered mountains where the glaciers do not reach the sea; the former, in the case of those extensive fields of ice which cover islands and continents and extend to the sea. The best examples are Greenland in the northern, and the South Polar Continent in the southern hemisphere.

QUADRANGLE

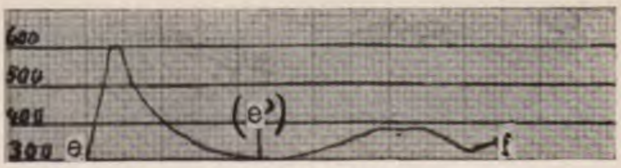
I A. Topographic



I a. Longitudinal
Horizontal Sca
Vertical Scale,



I C. 100 Ft. Contours, uncolored



I c. Second Cross Section. Same Scales

PRACTICAL EXERCISES TO EXPLAIN THE TOPOGRAPHIC MAP

BY MARTHA KRUG GENTHE
Hartford, Conn.

A. Place of the work in the course of study:

THE intelligent use of topographic maps is the highest expression of a comprehensive and scholarly knowledge of the facts and principles of geography. It cannot, therefore, be expected of students before they possess a satisfactory working acquaintance with these facts and principles. Moreover, its explanation means such a continuous test of the pupil's ability to apply such acquaintance to the explanation of topographic features brought before him in the language of cartography, that no better opportunity can be found for reviewing, from entirely new points of view, the whole volume of geographic matter presented to him in a more or less systematic order in previous years. These considerations let the introduction of topographic map studies appear most suited for the last year of the public school work in geography, and there it ought to be made the keystone in the whole arch of this instruction.

B. Preparation:

The contour map is the highest, the most differentiated, the most scientific reproduction of surface forms. In order to be well understood it must be preceded in the curriculum by the lower, the simpler, the more elementary forms of such reproduction, and as no reproduction can be fully appreciated without an acquaintance with the original, the surface forms themselves must stand at the beginning of the work. Outdoor study and the sand pan are the preparatory school of map study. To the kindergarten and the early primary work belong the first observations of topographic facts, and their reproduction in sand or clay. After this the plan of the school room introduces for the first time the fundamental principle of cartography: maps show *where* things are, not the things themselves.

The next step, still belonging to the phase of home geography, will be the application of this principle to objects outside the schoolroom, viz. the translation of a model (of the school grounds, or of the school district) or of a plastic relief, into the language of cartography. First, location: "instead of putting the things themselves in their proper places, we will now put *signs* in the places where the things ought to be." Secondly, elevation: how this can be demonstrated has been shown in an earlier article in this magazine.[1]) Thirdly, upon graduating from home geography: the use of maps like those in the Natural and Dodge's Geographies which show elevations in accordance with the international color scheme. The innovation undertaken in the latter of presenting each continent and the United States in the two schemes: first by way of the current school geography relief map and secondly by way of the color scheme, will prove especially helpful for a better preparation of topographic studies.

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[1] Journal of Geography, Vol. II, 1903, pp. 234, 235.

C. The work itself.

After such preparation in the lower grades the exercises in scientific topography will be a delight to both teachers and pupils. If they are fortunate enough to live in a place whose quadrangle has been published in the topographic atlas of the United States, the work will be started on that sheet, of course.

1. The difference between the physical (= colored contour) map of the text-book and the topographic sheet is one of degree, not of principle. The progress from the former to the latter requires therefore no new start, but can be effected by a natural and gradual transition.

If we should omit the colors on the text-book map, leaving nothing but the boundaries between the areas of equal coloring, the result of such omission would be a primitive contour map. Likewise, by coloring the areas of equal height on the topographic map, we should modify it into a very differentiated specimen of the familiar map of the text-book.

Then the connecting link between the two can be easily supplied. Let the teacher, at the expense of a little time, patience, and water color, transform the home quadrangle (or the most important part of it) into a colored contour map. After some experimenting even a novice in the art of painting can do it quite easily. The paper of the sheets is quite suitable for the purpose, only care must be taken not to allow the color to stand too long in one place, nor to start the painting of a second coating before the first is perfectly dry. The painting begins with the highest areas, and each preceding contour space is painted over again with every next lower one; in this way one shade of brown (of which a sufficient supply must have been prepared beforehand) will produce a scale of from six to ten different shades on the map. If the relief is little differentiated, the 100 feet contours present the most convenient boundaries for the different shades; but where altitudes are very high, it is wiser to make the distinction only at every 200 feet, or at even greater intervals. Where a great many shades are necessary, a different color can be taken for the valleys: green or yellow will do best for this purpose. In such a case, the limits of the two colors ought to be chosen before starting the painting, so that the change in color may correspond somewhat to a topographic change. Then after the brown is done,

the lower color is put on in the opposite way, viz.: painting first over all of the valley area and after this taking the lower and lower regions over and over again until the lowest places show the deepest green or yellow.

When confronted with the so modified sheet, as a very accurate and much specified map of the district [See Plate 1, B], the child will easily understand its language. By locating objects which he knows: hills, water courses, villages, single buildings, roads, etc., and reading their heights (by hundreds of feet) by means of the color scale, he becomes familiar with the detailed application of the color principle. He recognizes that the system of expressing elevation used in his text-book is capable of an extension far beyond that of the text-book map and can be made to speak with an accuracy which almost equals actual conditions.

2. The next fact which must be brought home to him is that contour alone, without the coloring, suffices to express elevation. For this purpose the teacher will make (on transparent paper or by means of carbon paper to save time) a copy of the colored sheet on which only the contour lines of the different shades appear. [Plate 1, C.] Presenting the two maps to the class for comparison, he will, by the same exercises in location as under (1), make them familiar with the new appearance of a well known picture. After some practice the question whether further differentiation is desirable will present itself quite naturally. Then the regular sheet with all the contours will make its appearance and the explanation of the scale and of the conventional signs. The measurement of actual distances, heights, etc. can be entered upon.

3. Now the pupil can ascertain how far the map gives a true account of existing conditions. Armed with a tape measure let him try distance; [illegible] the distance between two places which he knows, and allowing from [illegible] to twenty minutes per mile find out how long it would take to get from one to the other. [illegible] to see the scientific aspect of a familiar experience. [illegible] how long it will take to cover the same distance on horseback [illegible] automobile. [illegible]

[illegible]

[illegible]

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3. Now the pupil can ascertain how far the map gives a true account of existing conditions. Armed with a tape measure let him, for instance, calculate the distance between two places which he knows and, allowing from fifteen to twenty minutes per mile, find out how long it would take to get from one to the other. If he has ever walked that way he will be delighted to see the scientific aspect of a familiar experience. Or let him find how long it will take to cover the same distance on horseback, by wheel, electric car, railroad, automobile. Choosing roads which run more or less smoothly at first, progress may be gradually made to sections of the map where the grades are steeper, and where allowance must be made for going uphill.

4. This leads to the determination of actual relief. A very valuable exercise in this line is the drawing of sections, either through a division of the map [Plate 1, IB, IC; Plate IV, B], or through some prominent elevation

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[1] If by mechanical multiplication a sheet can be provided for each child, so much the better. The expense will come only once, since the same sheet can be used for this purpose every year.

by drawing a section on an intermediate scale, five inches to the mile, for instance, in true proportions, by taking five inches for the horizontal mile and fifty contours on the vertical inch. In this way even comparatively long sections can be reproduced in true scale without wasting too many yards of paper. This is the case on the small, but very instructive Fig. d on Plate II. Everyone who knows the characteristic outline of Rattlesnake Mountain will recognize it at a glance on that diagram. Where even this scale requires more space than is convenient, as in Fig. II, Plate III, the horrors of Fig. Ia can be mitigated by reducing the heights at least to the 1 :5 scale, as shown in Fig. III on the same plate. If the relief is much varied, as in the region represented on Plate IV, even a partial reproduction on the five-inch scale may show the characteristic features: Fig. BI on that plate demonstrates very well the monadnock-like elevation of the mountain above the gently rolling peneplain and in Fig. BII, same plate, the 1 :5 scale affords a good contrast between the broad lowland, the fault line, the proud monadnock, and the monotonous upland.

5. A final exercise, and one which the children will greatly enjoy, is the making of a model based on the contour map. Cut in thin cardboard, of which no fewer than 25 sheets will be an inch high, the coutours of one prominent hill, mountain, or valley, cutting first along the contour lines on the map and after this placing the cut out piece on the cardboard and cutting out the latter along the edges of the pattern so obtained. Begin at the lowest contour, so that each following portion is smaller than the preceding and can be pasted on to the same in such a position as was the contour on the map. When you get to the top a perfect little mountain will be finished, from five to ten times overheightened, of course, but even so less distorted than a crude clay model would be. If you desire, you can fill out the spaces between the cardboard layers with some soft material, but this is not necessary. The mountain, when seen from above, will offer an aspect so much like that of the contour map that even the most obstinate adversaries of those maps will have to look for other arguments against them than their being too difficult for non-scientists to understand.

On this model the child can convince himself with his own eyes that where the contours come close together the slopes are steep, and that large contour intervals mean gentle slopes; that where contours are few and far between, the country is almost level; that parallel contours winding backward and forward in angle-like shapes mean valleys and ravines, etc., etc. Not a single phrase in the language of cartography need remain unexplained on a model of this kind.

After doing the work yourself, have the children do the same. It will develop their skill and patience as much as their geographic conceptions. Plates 2, 3 and 4 show pictures of such models which were made by my students at Mount Holyoke College in a teachers' course. Even in the photograph they speak for themselves. The expense need not be in the way: at two cents apiece, one hundred sheets will supply many generations of pupils if different parts of the map are cut up every year.

6. After the home quadrangle has thus been thoroughly studied, other sheets, of localities which the children have not seen, are taken up and treated in a similar way. The making of the model need not be repeated, but some sections ought to be made of each map, and a correct idea of the general configuration of the country should be gained by measuring distances and heights, locating places of importance, and exploring the region in imaginary travels in all directions. The children must finally be able to tell, after a short inspection of a new sheet, whether the country is high or low, monotonous or varied, densely or sparsely populated, etc. The collections of typical sheets published by the U. S. Geological Survey[1] are especially valuable for the purpose; but there are, of course, hundreds of sheets besides these whose study is worth while, and one chosen from a neighboring region will often arouse more interest than one whose names are mere names to the children. As long as care is taken that enough variety be found in the forms represented on the sheets, any selection of sheets will do in the hands of a competent teacher.

7. Where a quadrangle of the home district is not available, the best start in the work would be made by using the colored contour map of the United States published by the U. S. Geological Survey, of which also an uncolored edition exists.[2] The latter must then be used as would the home quadrangle under 2 and 3; but for the exercises under 5 and 6 its scale is not large enough, and the section and model work must therefore be started right away on any other sheet whose topography is clear enough not to make the first steps in this path too difficult.

8. At the conclusion of the work a few remarks on the government office which furnishes these maps will not be out of place. The work of the U. S. Geological Survey is done for the people, and the people ought to know what abundance of geographical information is at their disposal for the asking, or at a trifling expense. The ignorance of large classes of the population concerning these things is appalling. But can we blame them for not knowing what they have never been taught?

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[1] Topographical Folios, Nos. 1 and 2, by H. Gannett, 25 cents each.

[1] Map of the United States, 18 by 28 inches, on a scale of 111 miles to an inch, price 10 cents; 100 or more, 4 cents each. Relief map (colored) and contour map (uncolored).

TRANSPORTATION—PART VI[1]

BY J. T. HOLDSWORTH
Drexel Institute, Philadelphia

FINANCIAL CONTROL

AS a result of the rapid and far-reaching consolidations of the last few years a large part of the railway mileage of the country is dominated by a half-dozen groups of railway financiers, each of which practically controls a great system occupying a more or less distinct and exclusive territory. The chief of these syndicates or groups are the Pennsylvania, Vanderbilt, Gould, Harriman, Hill-Morgan and Moore systems. The Vanderbilt and Pennsylvania lines are all powerful in the trunk line territory, extending from the principal Atlantic seaports to Chicago and Mississippi points—the richest traffic region in the world. Both of the systems have practically double road connection between the seaboard and Chicago. The Baltimore & Ohio offers an alternative route to the Pennsylvania, while traffic over the Vanderbilt lines may go from New York to Buffalo by either the New York Central or the West Shore, and from Buffalo to Chicago by either the Nickel Plate or the Lake Shore. Moreover, these two great interests exercise joint control over the leading "coalers"—the Reading, the Chesapeake & Ohio, and the Norfolk & Western. The so-called transcontinental territory, extending from the Lakes and the Mississippi to the Pacific Coast, is divided between the Hill-Morgan roads—the Northern Pacific, Great Northern, and Burlington—at the north, and the Harriman lines in the middle and south—the Union Pacific and the Southern Pacific. Both the Hill and the Harriman systems have steamship lines from their Pacific termini to the Orient. The Gould properties reach out from St. Louis westward as far as Colorado and Utah by the Missouri Pacific and the Denver & Rio Grande; southward to the Gulf and the Mexican border by the Iron Mountain and the Texas & Pacific; eastward to the Lakes at Chicago, Buffalo and Toledo by the Wabash, and now, yet farther east to Pittsburgh and the seaboard at Baltimore over extensions of the latter system. The Rock Island system, controlled by the Moore interests, covers the grain and live stock regions beyond the Mississippi, and is especially strong in the Southwest.

Although these great systems own or control nearly two-thirds of the total mileage of the country, there are some independent roads that must be noted in this summary of the general railway situation. In transcon-

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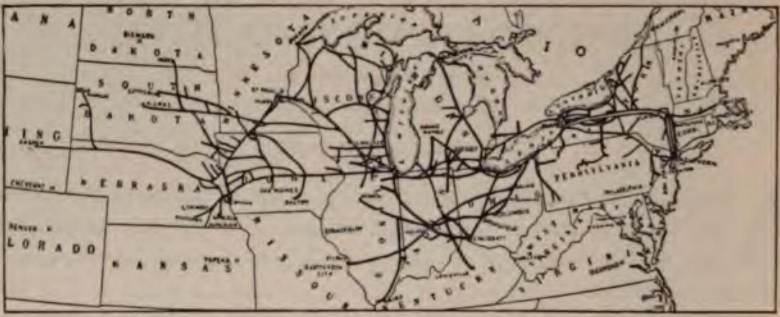
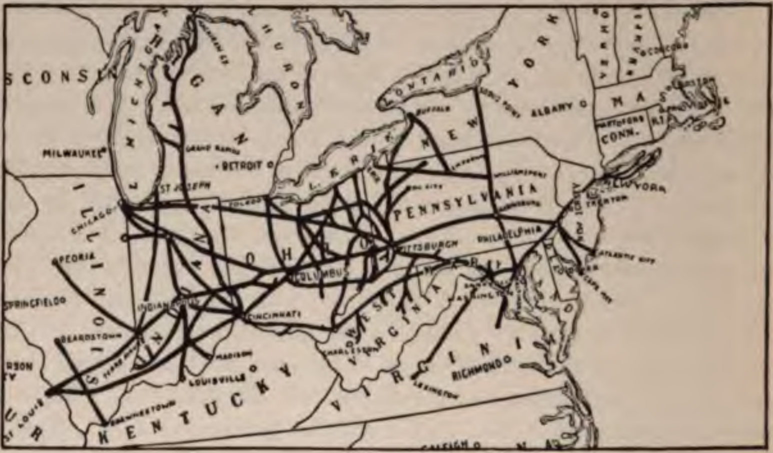
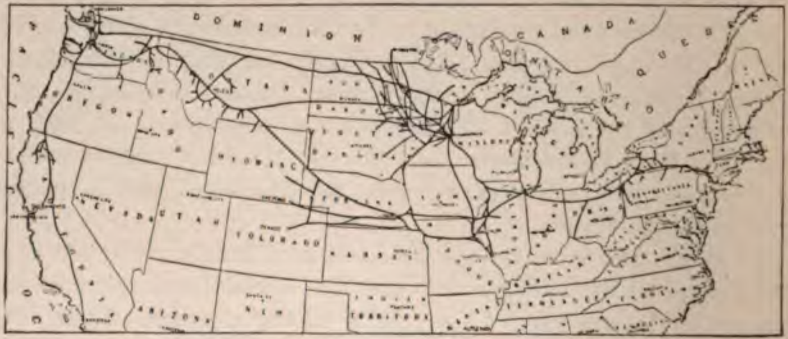
[1] Continued from Vol. IV, Page 173.



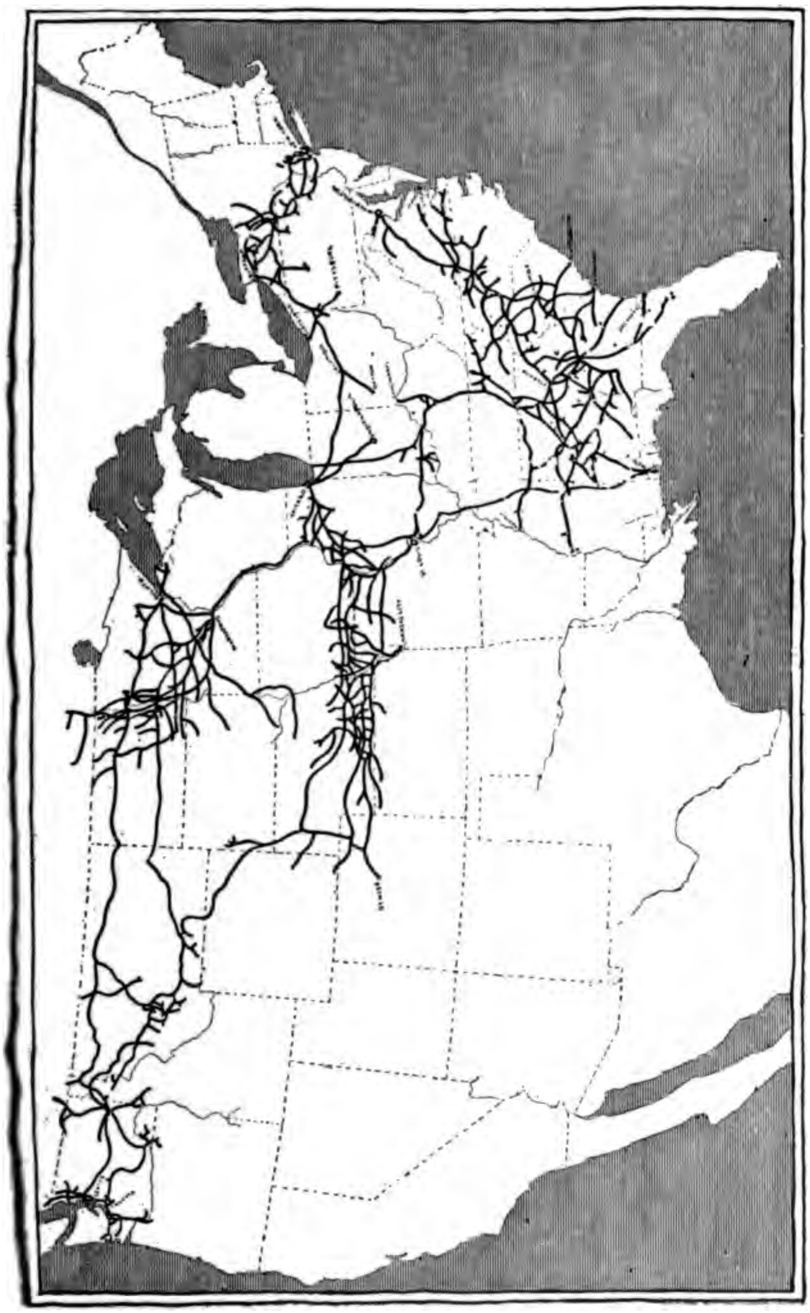
The Vanderbilt Lines



The Pennsylvania System
By courtesy of the American Monthly Review of Reviews

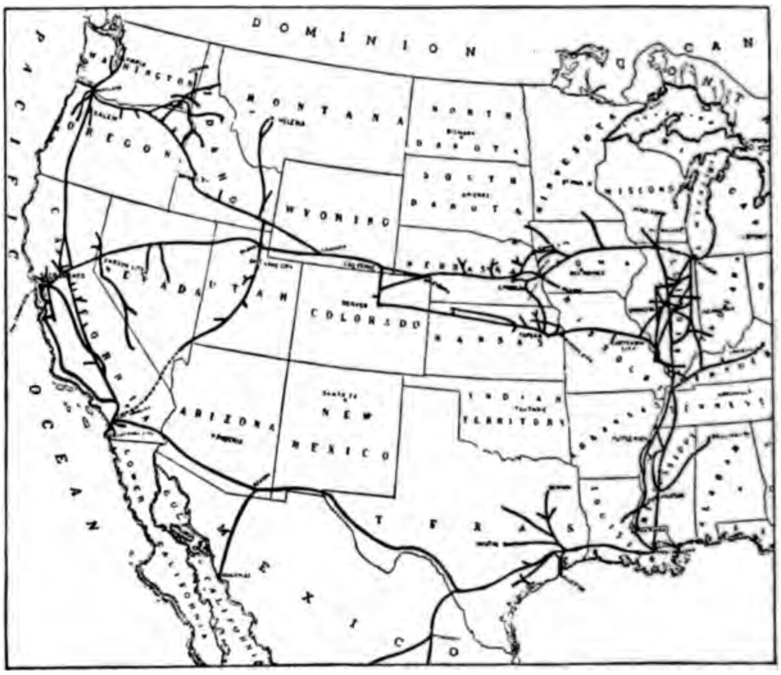


The Morgan-Hill System
By courtesy of the American Monthly Review of Reviews

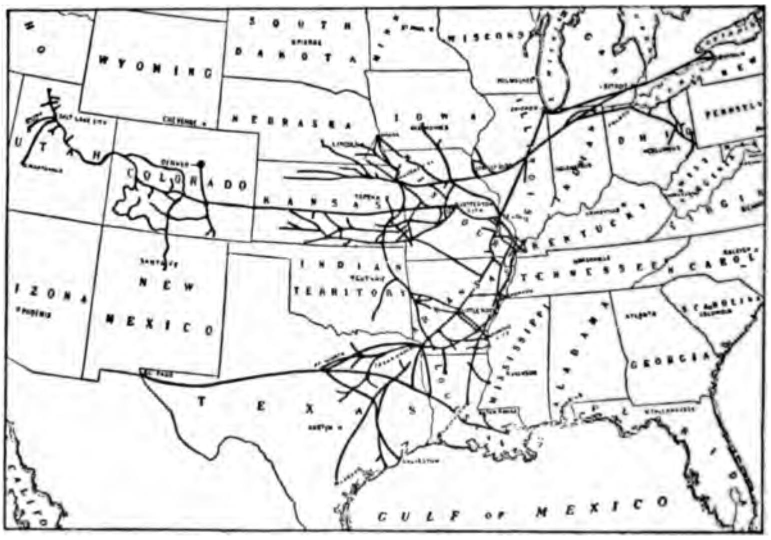


The Hill-Morgan Lines

Courtesy of Public Opinion

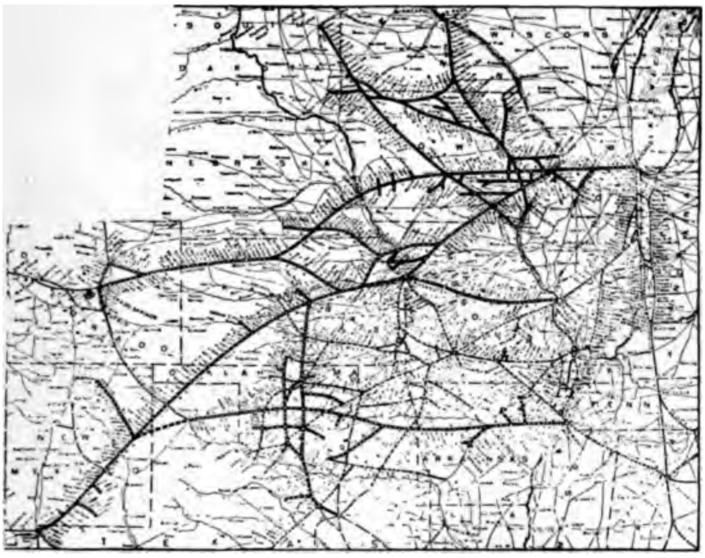


The Harriman System
By courtesy of the American Monthly Review of Reviews

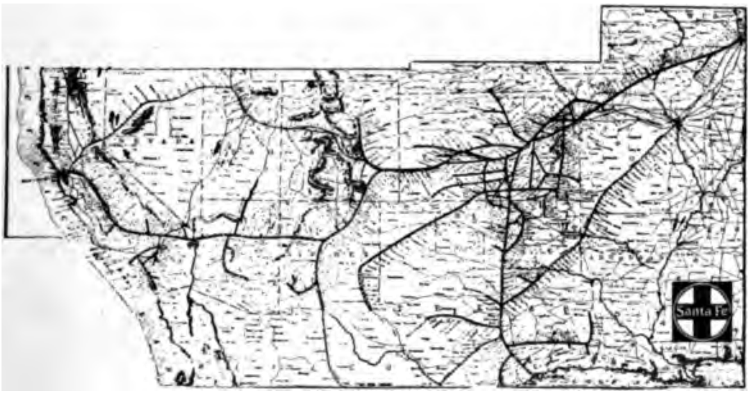


The Gould System
By courtesy of American Monthly Review of Reviews

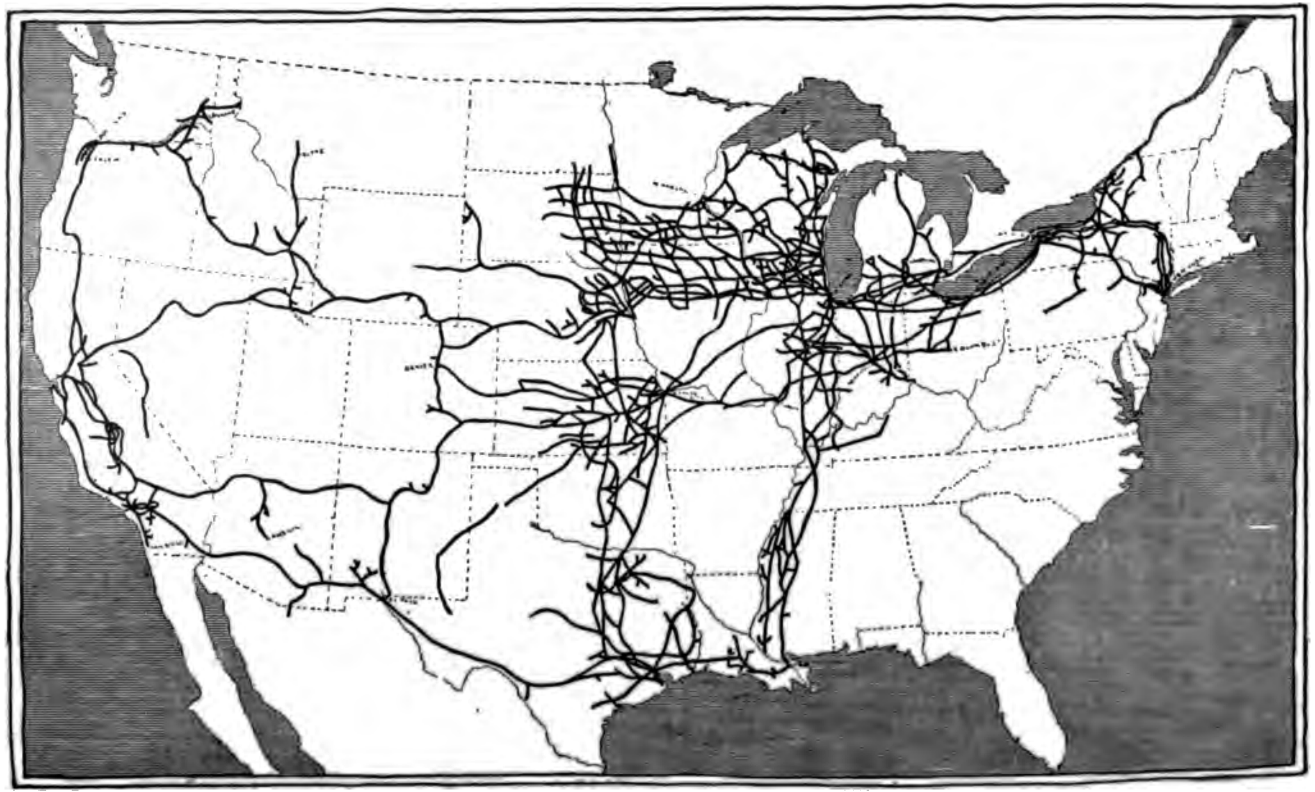
tinental territory, for example, the Santa Fé, stretching away from Chicago through Kansas City and Denver to the Pacific coast at San Francisco with southward lines to Galveston and El Paso, might in unfriendly hands prove a formidable rival to the dominant Harriman lines. The Standard Oil-Harriman interests are reputed to have large influence in the control of the Atchison and for some time rumors have been afloat that the Pennsylvania is deeply interested in that road. Other lesser competitors in the Southwest are the Missouri, Kansas & Texas and the projected Kansas City, Mexico &



The Rock Island System

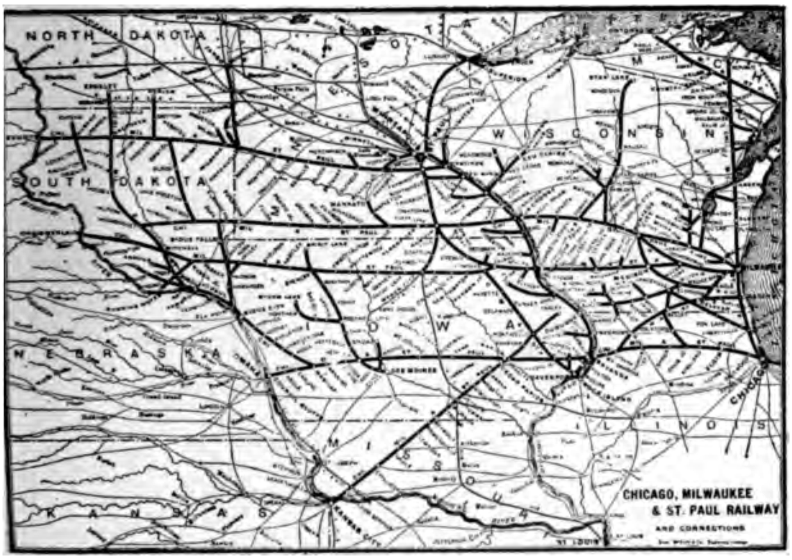


The Santa Fe Lines

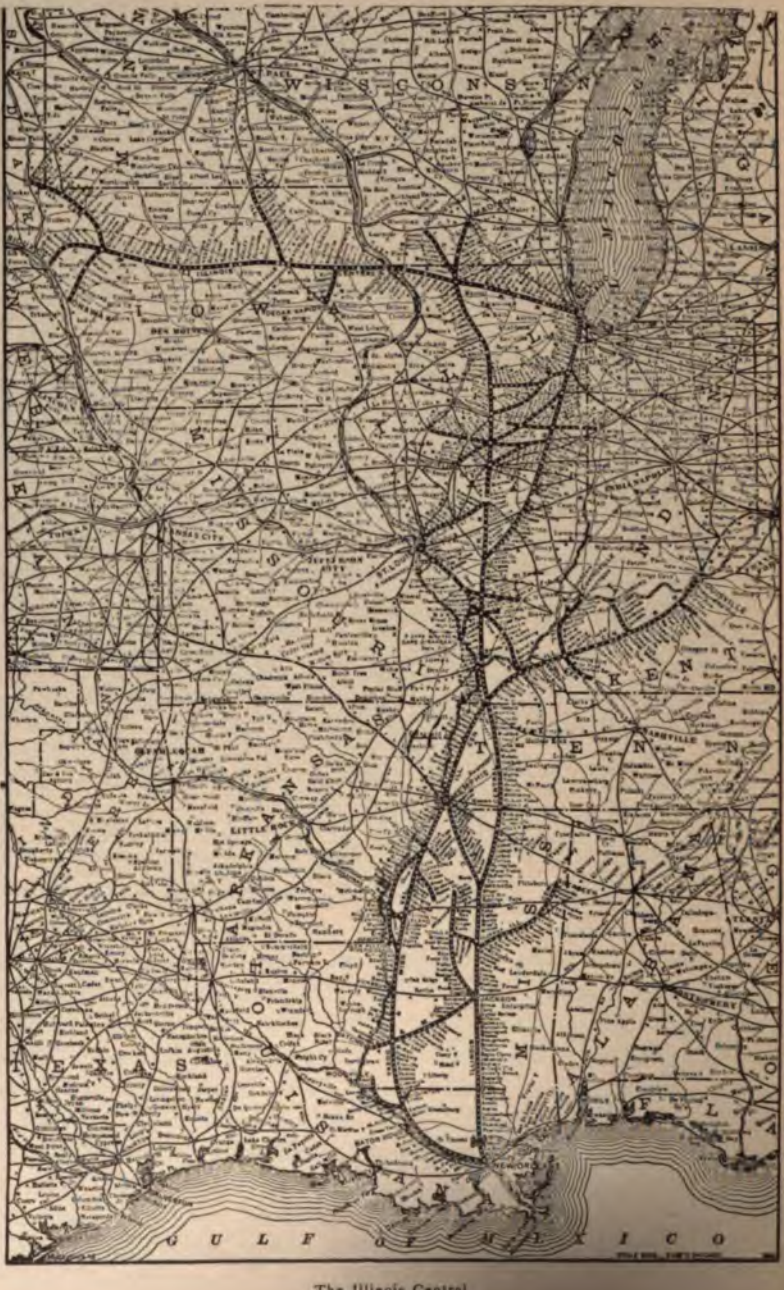


blic Opinion

ient, to extend from Kansas City to Port Stillwell on the Mexican Pa- c coast. In the Northwest the Chicago, Milwaukee & St. Paul, generally arded as a Standard Oil road, divides the territory of that rich grain ion with the Burlington and the Northwestern. The Illinois Central, upying the fertile trough of the Mississippi Valley, and the Erie, parallel- ; the two giants of the trunk line territory, are generally classed as inde- idents, though the Harriman and Vanderbilt interests have a voice in the airs of the former and the Hill-Morgan influence is strong, if not domi- it, in the latter. The recent merging of the Père Marquette, the Cincin- i, Hamilton & Dayton, and the Chicago, Cincinnati & Louisville has



ought into the Middle States another important independent. The high Valley, nominally independent, extending from the seaboard to ffalo, exerts considerable influence in that part of the trunk line territory. ew England territory is divided between the Boston & Maine, controlling e northern section, and the New York, New Haven & Hartford domi- ting the southern half. South of the Ohio and east of the Mississippi the rritory is divided among the Louisville & Nashville-Atlantic Coast Line oup, the Southern and the Seaboard Air Line. Here consolidation has oceeded more slowly, but absorption of the smaller roads by the few large tems is only a question of time. The Morgan interests control several of e Southern roads.



The Illinois Central

The following tables present a general summary of the leading railway groups:

Rock Island System:	MILES
Chicago, Rock Island & Pacific	5,604
St. Louis & San Francisco	3,947
Chicago & Eastern Illinois	751
St. Louis, Memphis & Southwestern	416
St. Louis & Gulf	265
Choctaw, Oklahoma & Gulf	1,174
St. Louis, Kansas City & Colorado	313
Choctaw, Oklahoma & Texas	203
Houston & Texas Central	690
Colorado & Southern	1,121
	14,484

Pennsylvania-Vanderbilt (*joint control*)	
Reading	2,145
Central of New Jersey	638
Chesapeake & Ohio	1,641
Norfolk & Western	1,721
	6,155

Hill-Morgan System:	
Great Northern	5,888
Northern Pacific	5,976
Chicago, Burlington & Quincy	8,739

Morgan Roads:	
Southern	7,137
Mobile & Ohio	912
Chicago, Indianapolis & Louisville	556
Cincinnati, New Orleans & Texas Pacific (jointly with C. N. & D.)	338
Atlantic Coast Line	4,557
Louisville & Nashville	6,133
Nashville, Chattanooga & St. Louis	942
Georgia Railroad	614
Central of Georgia	1,902
	23,091

Vanderbilt System:	MILES
New York Central & Hudson River	3,092
Boston & Albany	394
Rutland	415
Delaware, Lackawanna & Western	947
Lake Shore & Michigan Southern	1,702
Michigan Central	1,658
New York, Chicago & St. Louis	533
Cleveland, Cincinnati, Chicago & St. Louis	2,355
Lake Erie & Western	887
Pittsburgh & Lake Erie	127
Chicago & Northwestern	7,365
Chicago, St. Paul, Minneapolis & Omaha	1,676
	21,151

Harriman System:	
Union Pacific	2,963
Oregon Short Line	1,824
San Pedro, Los Angeles & Salt Lake	89
Oregon Railway & Navigation Company	1,152
Southern Pacific	8,933
Chicago & Alton	915
	15,876

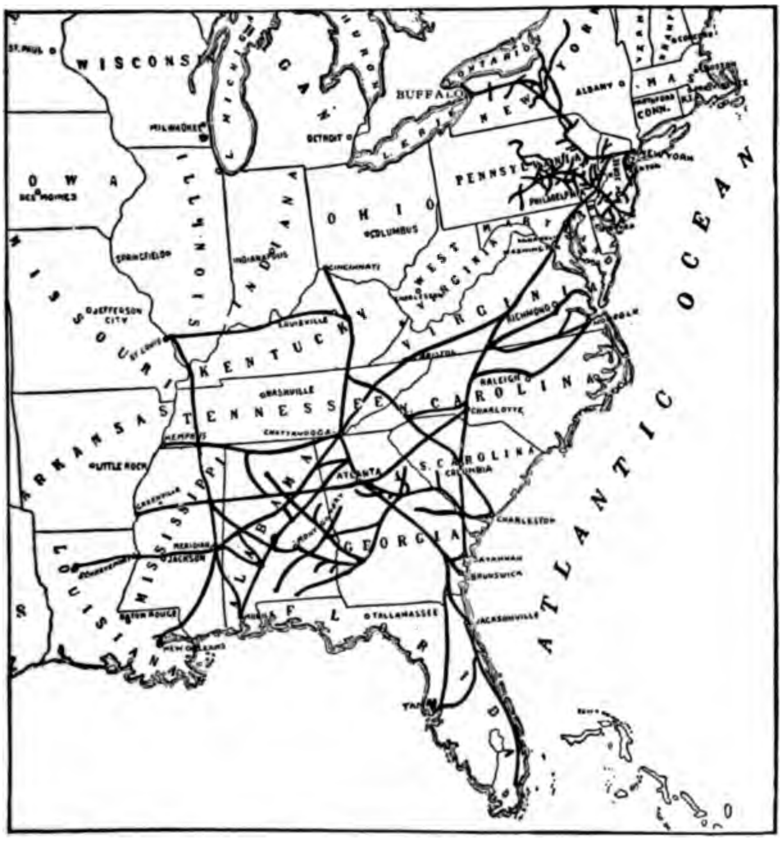
Gould System:	
Missouri Pacific	3,892
St. Louis, Iron Mountain & Southern	2,215
St. Louis Southwestern	1,279
Texas & Pacific	1,827
Denver & Rio Grande	2,460
International & Great Northern	1,159
Wabash	2,485
Wheeling & Lake Erie	473
Western Maryland	258
West Virginia Central & Pittsburgh	162
	16,210

	MILES
Pennsylvania System:	
Pennsylvania Railroad (east of Pittsburgh)	5,822
Pennsylvania Company (west of Pittsburgh)	4,739
Baltimore & Ohio	4,438
Long Island	392
Grand Rapids & Indiana	590
Terre Haute & Indianapolis	659
	16,640
Leading Independents:	
Atchison, Topeka & Santa Fe	8,943
Chicago, Milwaukee & St. Paul	5,655
Illinois Central	4,301
Yazoo & Mississippi	1,162
Cincinnati, Hamilton & Dayton	1,015
Pere Marquette	2,195
Chicago, Cincinnati & Louisville	294
Boston & Maine	2,343
Erie	2,318
Lehigh Valley	1,399
New York, New Haven & Hartford	2,037
New York, Ontario & Western	548
Missouri, Kansas & Texas	3,043
Chicago Great Western	846
Kansas City Southern	839

Even the most general summary of the financial control of American railways would be incomplete without notice of the Rockefeller or Standard Oil interests. The Rockefellers are closely allied with both the Gould and the Harriman groups in the West, and with the Vanderbilts in the East. They are largely interested, also, in the New York, New Haven & Hartford, Ontario & Western, Lackawanna, Atchison, St. Paul, Delaware & Hudson, and other lesser roads. So closely have the railway interests of the Vanderbilts, the Rockefellers and Harriman been merged or identified that recent railway literature speaks of the Standard Oil-Harriman-Vanderbilt interests.

Another important figure in railway control is Edwin Hawley. The Minneapolis & St. Louis (642), Iowa Central (558), Colorado & Southern (1121), and the Wisconsin Central (977) are generally included in the list of Hawley roads, but control of the Colorado & Southern has probably passed to the Rock Island. Close community of interest obtains between the Hawley and the Rock Island groups, and in turn between the Rock Island and the Southern Pacific. Less conspicuous, but none the less powerful among railway financiers, are Jacob Schiff, of Kuhn, Loeb & Co., Speyer & Co., August Belmont & Co., and other leading banking houses. The extent to which banking interests have dominated railway policy and control in recent years is one of the most interesting and significant phases of railway development.

The group arrangement of the leading railroads suggested above must not be regarded as complete or irrevocably fixed. Community of interest, consolidation and absorption are still going on, and most, perhaps all, of the independents are likely, sooner or later, to fall under control of one or other of the great groups named. These groups themselves are more or less mobile, and though the main lines and general trend of the railways of the United States are now pretty definitely laid, readjustments and new combinations are likely to occur before comparative permanence is attained. Not infrequently alarm has been expressed that the process of consolidation will



Territory of the Morgan System
By courtesy of American Monthly Review of Reviews

ultimately result in the concentration of all our railroads in the hands of a few non-competing groups, and that then shippers, consumers, the public generally, will be helpless in the grasp of the railroad monopoly. That the railway corporations are very powerful must be granted, and their far-reaching influence can not be gainsaid. Concentration of railway control in the hands of a few great groups has proceeded rapidly. The tables given above show that two-thirds of the total mileage of the railroads in the United

States are controlled by a half dozen groups of financiers. But control must not be confused with ownership. Each group of railway capitalists or magnates represents thousands of individual holders of railway stocks and securities. The insurance companies, savings banks, trust companies, educational and other institutions, are large owners of railroad stocks. The life insurance companies are the largest investors in railway property, and through them thousands of policy holders and their families are the real holders of railroad securities. Likewise, the savings banks, which are very large holders of railroad securities, represent the interest of thousands of wage earners in railroad ownership. It has been estimated that the holders of stocks and bonds issued by the railroads of the United States number over 1,000,000. Control by a few financial leaders or groups has been made possible through the stockholders delegating to them the right of voting the stock. This is a right which at any time the thousands of stock and bond owners may withdraw. Moreover, the railway legislation suggested by the President and debated in the last Congress gives evidence of a growing determination on the part of the people's representatives to limit the power of the railway corporations to a greater extent than ever before and to require that "the highways of commerce must be kept open to all on equal terms."

(*To be continued.*)

THE BEST ARE NOT TOO GOOD

Why should superintendents and school officers not take the same care in the selection of maps that they take in the selection of books? There is as much difference, or more, between a good map and a poor one as there is between a good book and a poor one. County superintendents could well include maps in their recommended lists for the county. The importance of accurate, up-to-date and well-made maps cannot be overestimated.—*The Nebraska Teacher.*

PROF. SHERZER'S GLACIAL STUDIES IN THE CANADIAN ROCKIES AND SELKIRKS

The Smithsonian Institution has just published a brochure by Professor W. H. Sherzer of the Michigan State Normal College at Ypsilanti that will be a great delight to future travelers along the Canadian Pacific Railway and a means of realizing much of the beauty and interest of glaciers to those who cannot visit them. The 45 photographs, some of which are superb, will help much in this realization. One misses maps a little but these forty-three pages are only a preliminary to a fuller report in which maps no doubt will find their place. It is to be hoped that this paper may find wide circulation among teachers and students of nature.—M. S. W. J.

GEOGRAPHY IN THE NORMAL SCHOOLS OF THE UNITED STATES*

BY CHARLES REDWAY DRYER
Terre Haute, Ind.

FUNCTION OF NORMAL SCHOOLS

THE public school system of the United States includes about 145 State Normal Schools, whose function, as generally defined in the act of establishment, is the preparation of teachers for teaching in the common schools of the state. By "common schools" are meant those in which the primary and grammar grades, comprising the first eight years of the school course, are taught. The "common branches," or those which are universally taught in the common schools, are reading, writing, arithmetic, grammar and geography. To these some states add human physiology, history, English literature, music, drawing, nature study and more rarely, algebra and Latin. The fundamental work of the Normal School is to give instruction in the common branches and in "professional" studies, comprising pedagogy and its various cognate subjects. Most Normal Schools also provide courses of study in some of the secondary, academic, or collegiate branches of learning, which may prepare students to teach in the public high schools.

STANDARDS OF ADMISSION

The nominal standard of admission to the Normal Schools is the completion of the eighth grade of the public schools, or the possession of a teacher's license obtained by the regular county examination. A few Normal Schools require a diploma from a public high school for admission, but usually special courses of study are provided for such students.

COURSE OF STUDY AND PERIOD OF ATTENDANCE

The Normal course of study required for graduation varies from one to five years, according to the rank of the student at the time of admission. For the majority of students the length of the course is four years. Probably, on the average, not more than one-third of the students admitted remain until graduation and something like one-half attend the Normal School only one year or less. The majority enter for the purpose of preparing themselves to obtain, for a limited period, higher grades of license and fair positions in the common schools, with no intention of teaching as a permanent occupation. Consequently the freshman or first year class is apt to be very large, and the ranks of the upper classes to diminish sometimes to one-fifth the number of freshmen.

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*Read before Educational Section, Eighth International Geographic Congress, Sept., 1904.

POSITION OF GEOGRAPHY IN THE NORMAL SCHOOL COURSE

Geography, being one of the common branches and required for all grades of license to teach, falls, with few exceptions, in the first year of the course, and is taught to students who have had the least preparation. From the pedagogical or scholastic point of view, geography may be differentiated into two well marked varieties: (1) introductory geography, which gives in broad outline a general view of the world and its physical, biological and human activities, and serves as an open door to all the natural, historical and economic sciences; and (2) advanced geography, which comprises a synthesis and correlation of natural science, history and economics. It is evident that under the conditions which prevail in the Normal Schools, all but a small fraction of the geographic work done must be of the introductory variety.

LACK OF PREPARATION ON THE PART OF STUDENTS

For the Normal School teacher of geography a serious problem arises from the imperfection or absence of preparation on the part of the students. The state courses of study for the common schools include no more than four years of geography, which the child pursues between the ages of nine or ten and thirteen or fourteen. In many cases, by the downward intrusion from the high school of algebra, Latin or German, this has been reduced to three or even two years, and the child "finishes" geography at the age of twelve, when he is just beginning to be able to think. Ten or twenty per cent. of the high schools give a half year or a year to physical geography, but it is often very poorly taught by any teacher who happens to have a vacant period upon his programme. The high school course is usually a convenient period in which to forget the little geography learned in the grades. The result is that the knowledge of geography possessed by the average Normal freshman is difficult to evaluate. It may consist of a mixture in various proportions of blank ignorance, disjointed facts, parrot phrases, and less desirable pieces of pure mythology which stand in the place of scientific explanation. A most lamentable fact is that the geographic knowledge of the student lies so remote from his experience. He has wrestled with such problems as the change of seasons, the cause of tides, and rotational deflection at an age when it was impossible for him to understand them, and has never observed the path of Ursa Major or the varying points of sunrise and sunset. He is apt to know something about Thibet, Abyssinia and the Amazon, and nothing about the hills, valleys and streams of his own neighborhood.

The school geography of forty years ago consisted largely of memoriter recitation of names and locations. This was often so thoroughly done that the child retained through life a very practical knowledge of general descriptive geography. If it were well done to-day, it would furnish a foundation for teaching scientific geography in the high and Normal schools. Memoriter learning has been largely abolished from the grade schools, but scientific learning has hardly begun to come in. The house is empty, swept and garnished and its last state is worse than the first.

PROBLEMS OF NORMAL SCHOOL GEOGRAPHY

The Normal School is called upon to undertake such large propositions in geography as the following:

(1) It ought to teach the student to read and use the technical language of geography as it is embodied in maps, and this ought to include the higher forms of that language, such as colored, nachured and contoured topographic maps, population, product and weather maps.

(2) It ought to teach a large part of the subject matter of geography. It is never safe to assume that the student possesses any particular portion of it. The subject matter ought to be so taught that the student may realize his concepts and build up in imagination true and adequate models of the features and phenomena of the globe.

(3) It ought to give the student some insight into the methods of scientific investigation and lead him to appreciate the meaning of natural or scientific causation.

(4) It ought to make clear the scope and organization of the science of geography and its relations to other sciences and subjects of study and to practical affairs.

(5) It ought to ground the student in rational methods of teaching geography to common school pupils.

In view of the magnitude of these tasks, perhaps criticism of the results of geographic teaching in Normal Schools ought to be more considerate.

STATISTICS OF NORMAL SCHOOLS

An attempt has been made to ascertain what the Normal Schools are actually doing in discharge of the heavy geographic responsibilities laid upon them, but with only partial success. An elaborate printed *questionnaire* addressed to more than one hundred Normal Schools brought but twenty-eight replies. The causes of this meager response may be left to conjecture. Partial information was obtained from the catalogues of thirty-two additional schools. These sixty schools contain about one-half of all State Normal School students. They generally comprise the larger and presumably more flourishing schools in each state represented, and statistics compiled from them may give a somewhat flattering picture of Normal School geography in the United States.

THE COURSE OF STUDY IN GEOGRAPHY

The length of the course of study in geography has been computed on the basis of 180 to 200 exercises or periods per year. Of the sixty schools three devote one-fourth to one-third of a year to geography, fifteen one-half year, thirty one year, four one and one-half years, six two years, and two more than two years. The average course is a trifle more than one year.

In the attempt to determine the amount of emphasis laid upon the various phases of geography, the courses of study were classified as follows:

(1) Physiography, including an occasional term or semester of geology.

(2) Commercial geography.

(3) Pedagogical geography.

(4) General geography, comprising cases where no differentiation could be made out. Of fifty schools giving courses in physiography, fifteen devote to it one-third of a year, fourteen one-half year, thirteen two-thirds of a year, seven one year, and one more than one year.

Of thirty-eight schools giving courses in general geography, four devote to it one-fourth of a year, twelve one-third of a year, eight one-half year, five two-thirds of a year, five one year, three one and one-third years, and one two years.

Of sixteen schools giving courses in pedagogical geography, nine devote to it one-eighth to one-third of a year, four one-half year, and three two-thirds of a year.

Of nine schools giving courses in commercial geography, six devote to it one-third of a year, two one-half year, and one two-thirds of a year.

A summation of the aggregates of each phase gives to physiography twenty-nine years, to general geography twenty-three and one-third years, to pedagogical geography six years, and to commercial geography three and two-thirds years. The combinations of these phases in different schools are too various to be classified.

EQUIPMENT

The quality of the work done in Normal School courses can only be inferred from the equipment, preparation of the teacher and other indirect indications. Of twenty-eight schools reporting, five seem to have a fair equipment of maps, globes, pictures, models, lantern slides and specimens, nineteen a good equipment, and four an excellent equipment. Ten have a geographical library of 100 volumes or less, fifteen have from 100 to 500 volumes, and three have more than 500 volumes.

Very few schools possess a specially fitted geographical laboratory, but this is not essential to good work which can be done in the class room or physical laboratory. Twenty-eight schools report some systematic laboratory work, of which twenty-three seem to give a fairly adequate course. Twenty-nine schools report regular field work, consisting of from three to six excursions for each class.

PREPARATION AND DUTIES OF TEACHERS

In forty-three schools one or more of the instructors in geography have had special university training. While in forty-seven schools the teachers of geography give instruction in other subjects, in twenty-eight of these geography is allied with some other natural science, usually physics or geology, in five with history, and in fourteen with some less cognate subject.

CONCLUSION

Fifteen years ago geography had hardly been thought of as a natural science and a geographical laboratory scarcely existed in dreamland. No special preparation was thought necessary for the teaching of geography, which was commonly turned over to the teacher of history, or to someone whose chief interests were more remote from the subject. The work consisted largely of a study of political divisions with some map drawing. There was seldom a suggestion that the vicinity of the school might contain geographical features worthy of attention. To one conversant with these facts, the present status of geography in Normal Schools is encouraging. A professional school can hardly be expected to take the lead in promoting a branch of common education elsewhere neglected. As long as only three or four universities in the United States offer substantial courses in geography, teachers with university training in that subject will not be plentiful. In the common and high schools the supply of geography teachers who are as well trained as those in mathematics, languages or history, will await the demand.

While the teaching of geography in the Normal Schools is far from adequate, it is entering upon a new phase in which trained teachers and scientific methods will prevail. Progress is being made and there does not seem to be any occasion for the common schools, high schools or universities to throw stones at the Normal Schools upon this score. There is a fair prospect that the demand and supply of competent teachers of geography, both hitherto very small, may increase at a reasonable rate.

THE FALL LINE

BY EDITH A. DIETZ
Barnard College, New York City

ONE of the chief geographical determinants of the position and success of many cities in the Middle Atlantic States is the so-called Fall-line which marks the boundary between the Piedmont region and the Atlantic coastal-plain. This line extends from the mouth of the Raritan River in northern New Jersey clear to the Gulf States, where it gradually fades out.[1] At every point where the eastward-flowing Appalachian streams pass from the hard and highly-tilted crystalline rocks of the Piedmont belt to the soft, unconsolidated sands and clays of the emerged portions of the continental shelf, *i. e.,* the Atlantic coastal plain, falls and rapids of varying height occur. Hence the line which joins the points where falls occur on successive large rivers is called the Fall-line.[2] In the northern part of the plain, the Fall-line occurs just at tide-level, sometimes within the Piedmont. On the Delaware it is two miles above the margin of gneiss rocks, at Trenton ; on the Schuylkill it is three miles above the easternmost outcrop of granites and schists.

The history of the development of the fall-line, or fall-zone as it ought really be called, as it is often several miles in width,[3] has been briefly thus: Before the elevation of the present coastal plain, while its strata of Mezozoic and Cenozoic formation were being laid down on the submarine outwash of the Appalachian Old Land, the rivers had their mouths far above where they are now situated, and near the inner margin of the present plain, so there was practically no fall-line. Now that the plain has been elevated the rivers have deepened their channels in it more than in the crystalline rock of the Piedmont, making the transition from one to the other distinctly visible. As long as 75 years ago a state geologist attributed this line of falls to the hardness of the foundation rock of the Piedmont.[4]

On one side of the fall-line lies the coastal plain with its rich soils, muds and alluvial deposits, cut to a limited depth by the great rivers which cross it, its low relief, determined entirely by its hydrography,[5] its smooth, sluggish yet navigable rivers often mere tidal canals and estuaries.[6] On the other, the more or less rough or rolling Piedmont upland distinguished by its geological formation and its topography. It is composed of hard rocks of uneven surface, due to long-continued erosion and gradually rising, it merges imperceptibly into the Appalachian ridges. Its streams, running over rock bottoms, are far swifter and clearer and more diversified by rapids and reaches.[1]

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[1] U. S. Geological Survey 1885-6, pp. 548-549.

[2] Davis, Physical Geography, p. 1-34.

[3] Report Maryland Weather Service, Vol. 1, p. 116.

[4] U. S. Geological Survey 1885-6, pp. 548-549.

[5] U. S. Geological Survey 1885-6, p. 549.

[6] Maryland Weather Service, Vol. I, p. 112.

Starting, as I mentioned before, at the northern end of New Jersey, the fall-line is crossed by many rivers; of these the largest and most important are the Delaware, the Schuylkill, the James, the Potomac, the Roanoke, the Rappahannock and the Savannah. Situated where these rivers cross the series of slight faults with eastward downthrows, which cause the fall-line,[2] are such cities as Trenton, Philadelphia, Port Deposit, Baltimore, Richmond, Raleigh, Columbia, Augusta and Macon. Practically every city south of New York which is of great commercial importance, except Charleston and Savannah, which are seaboard towns, is situated along this lone. Thus the boundary of the Atlantic coastal plain is marked on nearly every large river by an important city.[3]

There are a number of conditions which, combined with the splendid water-power furnished by these rivers which cross the fall-line, have functioned in the development of the above-mentioned cities. Almost first in importance is the association of the up-stream limit of navigation. In the case of the Delaware, Susquehanna, Potomac and James Rivers, navigation is possible to ocean-going vessels up to the fall-line.[4] Further south this combination is less prevalent, largely because of the greater width of the coastal plain, which is over 100 miles wide at Raleigh, North Carolina; partly because the smaller volume of the rivers, which, south, drain only the plain and eastern slope of the Appalachian highland, while in the north they cross the mountain-barrier. Obviously manufacturers who have direct connection with the sea, especially those whose products are bulky in comparison to their weight, like the producers of pig-iron, have a great advantage over those who must transport by rail to the coast. It is estimated that the opening of the canal between Birmingham, Ala., and Mobile Bay will reduce freight charges 80 per cent. to manufacturers of iron and steel in that region.[4] Again, the general character of the two areas which adjoin the fall-line contribute largely to its importance.[5] The Piedmont furnishes minerals, iron, building-stone, slate, which are rendered accessible in some places by the cutting which the entrenched streams have done along the fall-line.[1] At Port Deposit and Jones Falls, Md., are extensive quarries of granite and gneiss. In both places, the streams not only help to uncover the rock and drain the quarries, but also to transport it to the coast.[2] The level coastal plain with its rich deep soils offers quick profits to the raiser of fruits and vegetables in the northern part, of cotton and tobacco in the southern, while the even topography permits of numerous railway lines. Throughout the section, but more especially in the south, there are the added advantages of nearness of raw materials and cheap labor to the centers of manufacture. It is against these two factors that the New England cotton mills are fighting what is in some cases a losing battle. Within the last few months the stockholders of the Booth mills, of Lowell, Mass., one of the oldest concerns in the country, voted to liquidate. Their failure was ascribed in great measure to the growing competition of southern mills. Southern merchants formerly went north for the goods which are now manufactured more cheaply at home, and the raw cotton which was once shipped north to be made up for foreign trade is now being sold from the south direct to Japan and China.[3] In the last decade the Southern States have trebled the capacity of their mills. At present there are over 300 mills situated near or in cotton fields along the fall-line from Virginia to Alabama, and the increase in the amount of capital invested in southern cotton mills from 1890 to 1900 was 131.4 per cent.[4] The southern mills have had the added advantage of being established in recent years, with corresponding improvements, some of which have not yet been introduced in the north. The first factory operated wholly by electricity, without belts or shafting is located in the south.[5] This method permits of the factory being placed on high ground away from the stream, thus securing accessibility and healthfulness. This operation of textile plants by electric currents derived from water power at a distance accounts largely for the apparent decrease in use of water, from one-half the total motive power used in the United States to about one-sixth, which was noted in the last census.[6] In North Carolina the increase in use of water was 20,050 horsepower, or 79.2 per cent.; in Georgia and New Jersey it was respectively 43.8 per cent. and 41.5 per cent.[7]

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[1] Report Maryland Weather Service, Vol. I, p. 175.

[2] *Ibid,* Vol. I, p. 116.

[3] Davis, Physical Geography, p. 156.

[4] Census Bulletin 1901, section of Alabama Manufactures.

[5] Davis, Physical Geography, p. 134.

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[1] Gilbert and Brigham, Introduction to Physical Geography, p. 69.

[2] Maryland Weather Service, Vol. I, p. 147.

[3] Adams, Commercial Geography, p. 87.

[4] Census Bulletin 1902, Manufactures, p. 14.

[5] *Ibid.*, p. 13.

[6] U. S. Census 1900, Vol. VIII, p. 133.

[7] *Ibid.*

Of the fifty millions invested in cotton manufacturing in seventeen Georgia towns, Augusta controls ten millions and Macon six millions. The increase in the value of cotton goods produced by South Carolina from 1890 to 1900 was $20,123,120, while the increase in North Carolina during the same period was $18,809,355. Of the seven advantages named in the census as causes for the successful localization of industries, the Southern States possess as regards cotton, five, *i. e.,* nearness to raw materials, accessibility to markets, waterpower, favorable climate and supply of cheap labor. Of the Virginia fall-line towns, Richmond is the most favorably located for it has an abundant supply of tobacco at its doors, a climate well suited to the handling of the leaf,[1] cheap labor, and the James River, which is navigable by large vessels and also furnishes abundant water power, for it falls nearly fifty feet at Richmond.[2] So favorable are all conditions to tobacco manufacture that large quantities of Connecticut, Pennsylvania and Havana leaf are brought into the state to be made into cigars. In 1890 there were 296 establishments capitalized at $10,536,198.[3]

From the time of the early settlements in Maryland the abundant water power furnished by the streams of the Piedmont has been applied first to grist and saw mills and later to the manufacture of textiles, cotton, wool and knit goods, and wood pulp.[4] Of these, cotton manufactures, especially that of cotton duck in Baltimore is most important. Another factor besides location on the fall-line, which has aided in the success of Baltimore is its position near a region famous for its fruits and vegetables as well as its oysters. All these products are canned extensively, in fact Maryland leads in the canning of oysters, tomatoes and peaches.[5]

Pennsylvania, on account of its abundant supply of fuel, coal, natural gas, timber, has used waterpower less extensively than almost any other state; at present waterpower represents only 4.6 per cent. of the total power used and is confined largely to grist and lumber mills, paper and wood pulp manufacture,[6] which are not Pennsylvania's chief products. The importance of its fall-line cities is due mostly to their position at the head of navigation on large streams and on north and south railway lines.[7] The state ranks first in the manufacture of carpets, with 48 per cent. of the total product of the United States, second in wool manufacture with 21.4 per cent. of the total for the United States, and second in hosiery, worsted and knit goods with 22.9 per cent. of the total product for the United States. Philadelphia is first in all of these manufactures, in fact carpets and woolen goods are restricted almost entirely to that city, and their establishment there antedates the Revolution.[1]

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[1] Census Bulletin 1902, Virginia Manufactures, p. 5.

[2] U. S. Geological Survey 1885-6, p. 549.

[3] Census Bulletin 1902, Virginia Manufactures, p. 5.

[4] Maryland Weather Service, Vol. 1, p. 146.

[5] Census Bulletin 1902, Maryland Manufactures, p. 22.

[6] *Ibid.,* Pennsylvania Manufactures, p. 4.

[7] *Ibid.,* p. 2.

Philadelphia's importance in shipbuilding is due to its proximity to the great iron manufacturing establishments of the state, to the depth of the river close to the shipyards and to mild winters which allow outside work on vessels.[2] Next to the River Clyde in Scotland, the Delaware is now the greatest shipbuilding stream in the world. More of our government vessels are constructed at Philadelphia than at any other point. However, the commercial importance of Pennsylvania is largely due to its iron and steel manufactures located in the central and western parts of the state on the Allegheny plateau.

One important factor in the progress of Trenton, New Jersey, beside its position on the fall-line, and at the head of navigation on the Delaware is the presence of fine pottery clays in the vicinity. Almost the first attempts to produce in this country anything except the coarsest granite ware were made at Trenton.[3] From the establishment of the industry there in 1857 experiments were made with finer glazes. The success of exhibits of ivory porcelain and Parian vases made in Trenton factories at the centennial of 1876 greatly stimulated this industry. Higher grades of China of more artistic shape and finer glaze were soon made in many other factories and the success of Trenton pottery was established.

Although it is true that waterpower as a factor in manufacturing is generally decreasing in importance, and therefore mere location on the fall-line would not secure or maintain commercial importance for a city, it is obvious that in most cases, location on that line is connected with many advantages not found together elsewhere, and that the fall-line cities of the Atlantic slope will continue to maintain their present commercial importance.

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[1] Pennsylvania Manufactures, p. 9.

[2] Census Bulletin 1902, Pennsylvania Manufactures, p. 15.

[3] Census Bulletin 1902, New Jersey Manufactures, p. 8.

SYLLABUS FOR PHYSIOGRAPHY IN THE HIGH SCHOOLS OF NEW YORK CITY*

THE accompanying outline includes only the most essential principles and facts of physical geography, which must be studied in the classroom, laboratory, and field. While the order of presentation is not essential, the order given is logical, and is found to be good. The syllabus here given meets the requirements of the College Entrance Examination Board. Consideration is also given to the needs of the large number who do not go to college. Throughout the course, the subject is considered both from its scientific and economic aspects, and should be given at least one laboratory period each week. No general topic should be dismissed without a consideration of its human interest.

The candidate's preparation should include:

1. The study of a standard text-book, for the purpose of gaining a knowledge of the essential principles and facts of physical geography.
2. Individual laboratory and field work to the amount of at least forty counts, selected from a list not essentially different from the accompanying list.
3. Instruction by lecture-table demonstrations, and lectures illustrated by stereopticon views.
4. Collection and study of pictures illustrating the various phases of the subject.
5. Supplementary reading or library work, involving the report in class of the investigation of topics assigned by the teacher.

The attention of teachers is particularly called to the wealth of material available for study in the various museums of the City of New York, especially in the Natural History Museum, Eighth Ave. and 77th St.; also to the magnificently colored Bickmore slides, more than three hundred of which have been selected for use in teaching physical geography. Teachers who have not yet begun to equip their physiographical laboratories will find, by consulting the City School Supply Lists, that a very complete equipment is available.

THE EARTH AS A PLANET

1. ORIGIN:
   Solar system, relation to other planets, Nebular Hypothesis.
2. SHAPE:
   Evidences, consequences.

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3. SIZE:
    Methods of determining, consequences.
4. MOTIONS:
    Rotation: Axis, poles, rate, direction, consequences.
        Inclination of axis: Sidereal, solar, and lunar day.
    Revolution: Path, direction, rate.
        Change of seasons;
        Variation in length of day and year.
5. LOCALIZATION OF PLACES:
    Latitude:
        Determination of, and length of degree.
    Longitude:
        Determination of, length of degree, prime meridian.
    Time:
        Determination of local noon, and north-south line;
        The beginning of the conventional day;
        International date-line.
6. MAGNETISM:
    Magnetic variations;
    The mariner's compass.
7. MAPS AND MAP-PROJECTION:
    Uses and interpretation of maps;
    Common forms of map-projection;
    Relief maps: models, contour maps, hachure maps, color-relief maps.

THE AIR

1. PROBABLE ORIGIN.
2. COMPOSITION AND PROBABLE REASONS FOR.
3. FUNCTION OF AIR AND ITS SEPARATE CONSTITUENTS.
4. PRESSURE AND DENSITY:
    Measurement: mercurial barometer, aneroid barometer, barograph;
    Relation of pressure to altitude—probable depth of air;
    Variation in pressure; isobars, barometric gradient;
    Isobaric charts: cyclone and anticyclone.
5. TEMPERATURE:
    Source of heat;
    Insolation, and relation of insolation to temperature;
    How the air is heated and cooled;
    Measurement: thermometers, thermograph;

Distribution, determined by:
  Rotation and length of insolation period;
  Angle of insolation;
  Character of surface;
  Distance from sun.
Heat belts and areas: tropical, temperate, frigid;
Variation in temperature; isotherms, temperature gradient;
Isothermal charts: heat equator, cold pole;
Relation of temperature to pressure;
Relation of temperature to altitude: vertical temperature gradient (v. t. g.).

6. MOVEMENTS OF THE AIR—WINDS AND CURRENTS:
  Inauguration of movement—theoretical explanation;
  Classification of winds: planetary, terrestrial, continental, land and sea, mountain and valley, cyclonic;
  Causes and consequences of each class;
  Migration of terrestrial wind-belts—monsoons;
  Progressive movement of cyclones and anticyclones;
  Movement of winds about cyclonic and anticyclonic centers;
  Change of temperature in ascending and descending currents—adiabatic gradient;
  Winds classified as to velocity: light, moderate, brisk, high, gale, hurricane;
  Measurement of wind velocity: anemometer.

7. HUMIDITY OF THE AIR:
  Source of moisture: evaporation;
  Amount of moisture present: absolute humidity, relative humidity, saturation or dew-point;
  Measurement of relative humidity: hygrometer;
  Condensation of moisture:
    Clouds: cirrus, stratus, cumulus, nimbus;
    Dew and frost: relation of dew and frost to winds and clouds;
    Precipitation (rainfall): rain, snow, hail, sleet;
    Measurement of rainfall: raingauge;
    Distribution of rainfall: deserts, semi-arid regions, well-watered regions;
    Effect of mountains upon distribution;
    Cyclonic, tropical, and monsoon rains;
    Relation of rainfall to life and human industries;
    Relation of temperature to humidity.

8. WEATHER AND CLIMATE:
    - Weather and climatic elements:
    - Weather and climatic controls: latitude, altitude, distance from the sea, position with reference to mountains, to wind belts, and to prevailing paths of "highs" and lows";
    - Climatic belts and regions;
    - Man's relation to climate.
9. WEATHER MAPS:
    - Construction and interpretation;
    - Weather forecasting—its benefits;
    - Area of precipitation in cyclone;
    - Shifting of winds as determined by passing "high" or "low";
    - Direction of wind most apt to bring rain; fair weather.
10. ELECTRICAL AND LIGHT PHENOMENA:
    - Lightning, the Aurora;
    - Rainbow, coronas, halos;
    - Colors of the sky;
    - Looming and mirage.

THE SEA

1. AREA, DISTRIBUTION, USES, ADAPTATIONS;
2. COMPOSITION AND DENSITY OF SEA-WATER;
3. EXPLORATION OF THE SEA: SOUNDING AND DREDGING;
4. DEPTH OF THE SEA: MAXIMUM AND AVERAGE;
5. TEMPERATURE OF THE SEA: HOW ACQUIRED, AND HOW DETERMINED;
    - Horizontal and vertical variation in temperature;
    - Temperature of deep equatorial seas accounted for;
    - Temperature of deep mediterraneans accounted for.
6. MOVEMENTS OF THE SEA:
    - Waves: wind waves, earthquake waves, tidal waves;
        - Movement of wave form, and of water particles in wave;
        - Function of waves: modify shoreline, aerate seawater;
        - Tides: spring and neap, flood and ebb, rising and falling, slack water, bores;
        - Unequal length of period of rising and falling tide;
        - Relation of tides to navigation.
    - Currents:
        - Causes of currents;
        - Eddy-like character of currents;

Function of currents: modify climate, distribute temperatures in the sea, distribute sediments, affect commerce;

Icebergs and icepacks.

7. LIFE IN THE SEA:
    - Horizontal and vertical distribution;
    - Character of deep-sea forms;
    - Effect of certain forms upon the shoreline;
    - Comparison of shorelines of polar and tropical seas;
    - Coral reefs.
8. CHARACTERISTICS OF SEA-FLOOR:
    - General relief;
    - Deposits: source and character;
        - Continental shelf, open sea, deepest sea;
    - Economic importance of the continental shelf.

THE LAND

1. AREA, DISTRIBUTION, USES;
2. SURFACE OF THE LAND COMPARED WITH FLOOR OF THE SEA;
3. MINERALS: COMPOSITION, CHARACTERISTICS;
    - Rock-making minerals: types—quartz, feldspar, mica, hornblende, calcite;
    - Ores: important types—iron, copper, lead, zinc, tin, silver, gold;
    - Economic minerals: types—salt, sulphur, gypsum, graphite, apatite, corundum;
4. ROCKS:
    - Igneous: types—granite, trap;
    - Sedimentary: types—conglomerates, sandstones, shales;
    - Organic: types—limestone, bituminous coal;
    - Metamorphic: types—gneiss, mica schist, slate, marble, anthracite coal;
5. ROCK DISINTEGRATION AND REMOVAL—WEATHERING AND EROSION:
    - Agencies of disintegration: variation of temperature, freezing of groundwater, growth of plants, solution, "rusting" of minerals, decay of plants;
    - Agencies of erosion: wash of rains, winds, gravity ("creeping");
    - Formation of soil: local, transported;
    - Transportation and distribution of waste by streams.
6. RIVERS:
    - Disposal of rainfall: evaporation, groundwater, runoff;
    - Function of groundwater: caverns, springs, geysers, artesian wells;

- Work of rivers: drainage of the land, transportation of sediments, corrasion of channel, distribution of load;
- Life-history of a river:
    - Normal cycle: baselevel of erosion:
        - Youth: V-shaped valley, rapids, falls, lakes;
        - Maturity: disappearance of falls and rapids, shifting and adjustment of divides, profile of equilibrium;
        - Old age: meanders, ox-bow lakes, floodplains;
    - Cycle interrupted and new cycle introduced by:
        - Depression: drowned valleys, dismembered rivers, filled valleys, bays, estuaries;
        - Elevation: revived rivers, reversed rivers, entrenched meanders, antecedent rivers, engrafted rivers, river terraces;
        - Change of climate:
            - Moist to arid: drying up of rivers, salt lakes;
            - Warm to glacial: extinction of rivers by the ice sheet;
- Origin and function of lakes;
- Economic importance of falls and rapids.

7. GLACIERS: COMPARISON WITH RIVERS:
    - Conditions of formation, distribution, and work;
    - Types: Alpine, continental;
    - Glacial deposits and glaciated areas;
    - Glacial periods.
8. EVOLUTION OF LANDFORMS: THE GEOGRAPHIC CYCLE:
    - Length of cycle a function of:
        - Initial elevation of the land;
        - Vigor of eroding agents;
        - Resistance of rocks.
9. FORMS OF RELIEF:
    - Plains: coastal, alluvial, lacustrine, glacial;
        - Belted coastal plain;
        - The "Fall-line";
        - Economic importance of plains;
    - Plateaus: young, dissected, old, broken;
        - Production of mesas and buttes;
        - Economic importance of plateaus;
    - Mountains: block, folded, domed, massive;
        - Production of "Monadnocks";
        - Economic importance of mountains.

Volcanoes: origin, and distribution;
    Phenomena and materials of eruption, earthquakes;
    Lava flows, laccolites, volcanic necks and dikes.

o. SHORELINES:
  Regular, due to:
    Migration of former shoreline seaward;
    Smoothing action of waves and currents.
  Irregular, due to:
    Migration of former shoreline landward;
  Shoreline features of each class;
  Harbors: reef, fiord, estuary, river, atol, crater;
  Economic importance of irregular shorelines.

SUGGESTED LABORATORY EXERCISES

HE EARTH AS A PLANET:

Construction of diagram to scale showing the correct shape of the earth's orbit, and representing the earth at the equinoxes and solstices, showing the distribution of light over the earth at these times. (2)

Construction of a similar diagram for a globe whose axis is perpendicular, and for one whose axis is parallel to the plane of its orbit. (1)

Construction of diagram showing position of earth, moon, and sun at the several phases of the moon; explanation of these phases, and explanation of eclipses. (1)

Explanation of Eratosthenes' method of determining size of earth, and determination by this method of circle, given an arc. (1)

Construction of diagram illustrating the relation between solar, lunar, and sidereal days. (1)

With globe and diagram of earth's orbit to determine the length of the day at any time of year. (2)

Determination of latitude, north-south line, and local noon. (2)

Making Mercator's map of world. (2)

Making orthographic-polar projection of northern hemisphere. (2)

Study of contour map, as to drainage, distances, and relative heights. (1)

Making vertical sections from contour map. (1)

Making contour map from data given. (1)

THE AIR:

- Determination of altitude by barometer. (1)
- Determination of temperature of dew-point. (1)
- Study of isothermal charts of the world for January and July. (1)
- Location and migration of heat equator and cold pole. (1)
- Comparison of temperatures over land and water in different latitudes and at different seasons. (2)
- Study of the isobaric charts of the world for January and July, and the distribution of terrestrial winds for those months. (2)
- Study of the records of the thermograph, barograph, and hygrograph for a week. (2)
- Study of winds of North Atlantic and North Pacific from Pilot Charts. (2)
- Construction of weather map from furnished data. (2)
- Determination of barometric gradients and wind directions about a cyclone and an anticyclone in map made. (1)
- Study of distribution of cloudiness and rainfall about some storm center. (1)
- Prediction of weather conditions from data furnished. (1)
- Determination of average rate and direction of motion of storm centers in U. S. (1)
- Study of conditions of "cold waves" and "northeasters." (1)
- Study of some local storm, as recorded by N. Y. Meteorological Observatory, Central Park. (1)
- Keeping accurate and detailed non-instrumental daily record of weather conditions for a month, from observations taken about 9 a. m. and 3 p. m. (5)

THE SEA:

- Study of ocean current maps. (1)
- Study of tide charts. (1)
- Construction of tidal curve for some station for the month of December or January, from Tide Tables. (2)
- Study of map of world showing heights of land and depths of sea. (1)
- Study of trade routes across Atlantic and Pacific, from Pilot Charts. (1)
- Construction of diagram explaining production of tides; also explaining high, low, spring, and neap tides. (2)
- Study of the various types of shorelines, and their relation to commerce. (2)

Study of positions of lighthouses, life-saving stations, and large cities in relation to the Atlantic shore. (1)

Compare and account for the climates of the east and west sides of northern and southern continents, from study of charts of ocean currents. (1)

THE LAND:

Formation of table of nine minerals showing scale of hardness. (1)

Study of quartz, feldspar, mica, and calcite as types of rock-making minerals. (2)

Study of two ores each of iron, copper, lead, zinc, and tin. (2)

Study of the economic minerals: salt, sulphur, gypsum, graphite, and apatite. (2)

Study of granite, sandstone, limestone, soft coal, slate, marble, and anthracite coal. (2)

Study of the effects of weathering on rocks. (1)

Description of Harvard models. (2)

Construction of river profile., (1)

Making drainage map of U. S. (1)

Study and description of selected type topographic sheets, illustrating various stages of river and topographic development. (2 each sheet)

Study and description of Alluvial Valley of the Mississippi River. (2)

Study and description of selected sheets from 32-sheet map of the Lower Mississippi River. (each sheet 2)

Study and description of drowned river valley. (2)

Planning a journey and describing country to be seen. (1)

Field work, and excursions for the study of topographic forms, glacial phenomena, river work, shoreline features, rocks and minerals, and making topographic map, with detailed description, each (2). (Four excursions in fall and four in spring recommended.)

At the time of examination the candidate must present the note-book in which are recorded, with dates, the results of his laboratory and field work. This book must be indexed, and bear the endorsement of the teacher that the work is the pupil's own. The note-book will count for twenty per cent. of the grade in physiography. It will be returned on request.

EDITORIAL

SUMMER SCHOOLS OF GEOGRAPHY

THE Journal presents this month the annual announcement of the opportunities for teachers to study geography during the coming summer. No attempt has been made to note all the summer institutes at which geography will be taught but merely those, from which information could be secured, at which regular work for a period of six or more weeks will be carried on. Short term courses at summer camps or temporary institutes are valuable for giving inspiration and suggestions that will lead the hearers to do better work.

The more serious work however is to be found at institutions where the regular staff and the regular equipment are available as they are during the academic year.

From the standpoint of the teacher summer school work is most valuable for it gives an opportunity to devote one's attention unreservedly to one topic for a period of several weeks, thus securing more training and more satisfactory results than can possibly be secured from work carried on during the year parallel with class room work, for class room work always has first rights to one's energy and time.

The opportunity also to live amid the equipment and books of a large normal school or university is of great value to a student, especially to one who has been for several years hungering to get at sources of reference not available in a local library.

Intending students would do well also to attend a school at a distance from home if possible. The change of scene and of climate will be a rest and help, and the chance to see geography through travel is not to be looked down upon as valueless. Summer schools of geography are growing in numbers and in strength annually. It is to be hoped that the great variety of courses to be given during the coming summer will be even more successful than before. School geography must grow from the base upwards, and there can be no consistent growth unless the teachers occasionally take pains to grow ahead of their tasks and their pupils.

REVIEW

A MONOGRAPH ON THE ORIGIN OF THE SETTLEMENTS OF NEW BRUNSWICK[1]

THE borderlands between different subjects are always inviting fields of research in that the worker has the opportunity of bringing together facts and laws heretofore kept rather widely apart by the too sharp definition of individual subjects. Within the last few years we have had a number of excellent books which survey different aspects of the historical-geographical borderland. To that number is welcomed a recent publication of the Royal Society of Canada entitled: "A Monograph of the Origins of the Settlements in New Brunswick," by Dr. William F. Ganong.

This work of 185 pages is a most valued addition to both geographical and historical literature. The statistical data are well-arranged and to the point and are treated in a singularly clear style. In the introduction the author speaks of the irregularity of the geographical distribution of the various settlements and the diversity in nationality of the original inhabitants. Yet for all the complex interrelations which follow from these two conditions it is seen that "every settlement, great or small, has its position, size, and nationality determined by perfectly definite causes, in part historical, in part sociological, and in part environmental." The classification of the work is systematic throughout, the first divisions being made on the basis of time sequence, the second on the basis of the historical, sociological and environmental factors. The monograph is illustrated by nearly a dozen maps showing various distributions. The first is a general map showing the historic origins of settlements, then follow a soil map, a topographic map, a map showing the distribution of the population as to density, a railroad map, and then a series of smaller maps showing the distribution of the population at various stages of growth from the camp sites of the Indians to the cities of the present time.

The lack of an index to the work is partly made up for by an alphabetically arranged synopsis of the origins of individual settlements, an addition which shows the most painstaking industry. The whole work excels in the care exhibited in the collection and arrangement of data and is of value both to the general student and to the investigator in a similar field of work.

I. B.

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[1] A Monograph on the Origin of Settlements of New Brunswick. By W. F. Ganong. Pp. 288. J. Hope & Sons, Ottawa, Can.

RECENT PUBLICATIONS

THE STATESMAN'S YEAR BOOK, 1905. By J. Scott Keltie and I. P. A. Renwick, pp. 1424. The Macmillan Company, New York, 1905.

The latest volume of the Statesman's Year Book is, like its prdecessors, indispensable for reference for all workers in geography. Besides the usual up-to-date descriptions and statistics of all the countries of the world, this volume contains a series of maps, the most useful of which are maps showing the cotton and wheat producing areas of the world and recent boundary changes in South America.

GEOGRAPHEN-KALENDER, 1905-1906. By Hermann Haack, pp. 468. Justus Perthes, Gotha, 1905.

The third volume of the Geographen-Kalender includes a brief summary of geographical events in 1904, a bibliography of the chief publications of same year, obituary notices of the geographers who have died in 1904, and an address list of the geographers of the world. Sixteen maps illustrate the text, indicating the geographical changes of the year.

The Geographen-Kalender is a necessary volume to have at hand for reference and should be in every normal school library.

THE FIRST BOOK OF FARMING. By Charles L. Goodrich pp. 259. Doubleday, Page & Co., New York, 1905.

Goodrich's First Book of Farming is a simple, readable, well illustrated book devoted to the elementary principles of agriculture. The chapter on soils, the uses of soil and the conservation of soil moisture are especially valuable to the teacher of nature study or elementary geography

UNDERGROUND WATERS OF THE EASTERN UNITED STATES. By Myron L. Fuller, pp. 285. Water Supply and Irrigation Paper No. 114, U. S. Geological Survey, Washington, D. C., 1905.

Gives a brief account of the surface features, water supply and springs in different states. Contains a good introductory chapter on sources of ground water with map of rainfall of Eastern United States.

L'EVOLUTION DE LA TERRE ET DE L'HOMME. By G. Lespagnol, pp. 720. Ch. Delagrave, Paris, 1905

This volume is a good summary of general geography, including historical, mathematical, physical, biological, political and commercial geography. Would make a good text-book for a one year course in geography for normal schools.

CURRENT EVENTS

DISASTER IN INDIA

WHAT is probably the greatest calamity by natural forces since the destruction of St. Pierre occurred on April 4th, when a large part of Northwestern India was devastated by an earthquake. The center of the convulsion was in the foothills of the Western Himalayas, near Dharmasaia, on the border of Kashmir. That place was utterly destroyed, and 470 Ghurka soldiers were buried alive in their stone barracks. The Kangar Valley, as large as Massachusetts, was ravaged, Simla, the summer capital of India, was badly shaken, and Lady Curzon narrowly escaped death from a falling chimney. Considerable damage was done to the buildings even as far south as Lahore, and the shocks were distinctly registered in Germany.—*Collier's.*

SAFETY OF THE GREAT ASSOUAN DAM

The great success that has attended the operation of the Assouan dam, in extending the area of cultivable land in Egypt, recently led to the consideration of the question of raising the height of the dam by about eighteen feet —an addition which would greatly increase the capacity of the reservoir. At the request of the government, Sir Benjamin Baker, who is responsible for the design of the Assouan structure, was requested to make an investigation, in the course of which the fact developed that the rush of water, passing under great head and high velocity through the sluice gates, had worn out a series of cavities in the bed of the river below the dam. The structure is built in places upon a rock of a somewhat friable character, and in order to secure a perfectly broad and solid foundation platform, a broad table or bench of concrete was laid in the river bottom, upon which the masonry of the dam was built up. At the time of its construction, it was realized that the scour due to the rush of water through the sluice gates must be provided against, and the concrete platform was extended for a certain distance, forward of the downstream face of the dam. Acting upon Sir Benjamin Baker's recommendation, the concrete platform will now be carried a further distance downstream, so as to make sure that the effects of scour can never work back toward the dam and endanger its stability.

Simultaneously with the investigation of the dam, there appeared in England an academic discussion by two college professors of the question of the stability of dams in general. They advanced a rather fanciful theory as to the probable line of failure of dams, which was quite at variance with accepted and well-proved engineering theory on this subject. The proposal to increase the height of the dam; the chief engineer's investigation of the structure; and the curious theories of dam failure, above referred to, offered an attractive coincidence for the reportorial sensation monger, who seems to be getting wonderfully well acclimatized in the field of London journalism; and the British public has been treated to whole columns of matter tending to prove that this costly engineering improvement is doomed to short life, if indeed it is not liable to be swept down the Nile Valley without a moment's warning.

As a matter of fact, the Assouan dam, so far from being in any danger of failure, has a margin of stability so great as to render it possible to add the 18 feet of height suggested, and still leave the structure proof against overturning, or rupture, for all time to come.—*Scientific American.*

THE VESUVIUS OF AMERICA

Every traveler through Old Mexico hears of one spot which is more attractive to tourists from abroad than any other. This is the volcano of Popocatepetl. Some have called it the "Vesuvius of America," owing to the frequent eruptions which have marked its history; but unlike Vesuvius, its crater has been entered by man, and, remarkable as it may seem, here has been for centuries the site of a great natural industry. Popocatepetl has been producing sulphur probably for ages, according to the opinion of geologists and other experts who have examined the interior of the crater as far as it has been possible to venture with safety. True, it is by no means an extinct volcano. By day clouds of steam and smoke arise from the summit of the mountain, and at times in the night the sky above is illuminated by the glow from the fiery mass whose existence is revealed through the occasional vent here and there in the temporary bottom of the crater. It is a strange sight to witness human beings toiling in this abyss day after day, extracting the sulphur ore, as it is called, with pick and shovel, and "packing" it on their backs to the edge of the crater where it is hoisted to the top. Some of the peons have labored in these depths 550 feet beneath the earth's surface for the greater part of their lives, since sulphur mining, as it is called, has been carried on in the bowels of Popocatepetl for four centuries; yet no one knows when an eruption may occur which would destroy every living thing for miles around.

From where they toil, the workmen can clearly discern the fissures whence the escaping sulphur fumes and smoke prove that beneath them there is a furnace of nature; but were it not for the crevices the accumulation of the sulphur deposit would cease, for they form a portion of the great natural laboratory in which this material is compounded. The history of Mexico proves the age of this industry, for Cortez obtained sulphur, probably from the summit of the volcano, to use in manufacturing gunpowder for his soldiers. Since that time, the substance has been obtained by the natives when the volcano was not in such a state of activity as to keep them from approaching it. For several years recently a considerable quantity has been secured, although by a very crude method. As already stated, the beds are worked by hand labor, the sulphur being placed in bags containing 25 pounds each. They are placed on the backs of human packers who carry them to the foot of the crater and attach them to a rope suspended from the top. Then each is hoisted singly by means of a windlass. At the top the bags are given to other peons who seat themselves on straw mats and slide over the snow which covers the outer portion of the mountain to the timber line. At this point the sulphur is placed on mules to be transported to the railway station about nine miles distant.—*Scientific American.*

THE WIDENING OF VIENNA

On December 28 last the city limits of Vienna were extended on the east by taking into the municipality an area on the left side of the Danube about half as large as the city and including a number of towns. With the exception of a very small territory the city has hitherto been confined to the right bank of the river. The added territory will form the twenty-first district of Vienna, with the name Floridsdorf. It includes 9,314 hectares. which will increase the area of the city to 27,126 hectares. This makes Vienna now the largest city of continental Europe, and it is surpassed only by Greater London, with its area of 30,218 hectares. The result of the union is not so important in its addition to the population of the city, as it adds only 61,536 persons. The city in its new extent had, on December 31, a total population of 1,878,339, being still surpassed by London, Paris and Berlin in number of inhabitants. The *Deutsche Rundschau für Geog. u. Stat.* (Vol. 27, No. 6), from which these facts are taken, has a map of the city in its new extent on a scale of 1 :75,000, or 1.18 statute miles to an inch. —*Bull. Am. Geog. Soc., April, 1905.*

NOTES

Drift of a Bottle in the Atlantic.—A bottle thrown overboard in latitude 29° 30′ N., longitude 68° 10′ W., by Colonel Swalm, United States Consul at Southampton, England, in May, 1903, has just been found on the Donegal coast, Ireland, near Arranmore. The bottle had apparently been carried by the Gulf Stream and drift along the North American coast, then across the Atlantic to the Irish coast. To travel this distance it had taken 662 days, at an approximate speed of five miles a day.—*Bull. Am. Geog. Soc., April, 1905.*

AUTUMN RAINFALL AND THE YIELD OF WHEAT IN ENGLAND.—In the London *Times*, February 7, 1905, Dr. W. N. Shaw, F. R. S., called attention to a relation between the autumn rainfall and the subsequent yield of wheat which is remarkable. "Autumn" is a season of thirteen weeks, covering approximately the months of September, October and November, and the figures for the yield of wheat express in bushels per acre the average yield for England as given in the returns of the Board of Agriculture. With certain exceptions it is seen that "every inch of autumn rainfall involves a diminution of the yield of wheat for the following year by a bushel and a quarter per acre." Seven years out of the twenty-one considered give an agreement within a half bushel, when the yield is computed from the autumn rainfall by subtracting from the datum of 39.5 bushels per acre one and a quarter bushels for every inch of autumn rainfall. Among the reasons given for the influence of the autumn rainfall upon the wheat yield are the washing of nitrates from the soil, and the postponement of sowing to the spring because of the moisture; but still, the close relation remains a very remarkable fact. The study is based on averages over large areas, and the conclusions might have to be modified if separate districts were considered. Dr. Shaw read a paper on this subject before the Royal Society on February 2, 1905 (*Nature,* March 16), and the *Times'* letter is reprinted in *Symons' Meteorological Magazine* for February.—*Bull. Amer. Geog. Soc. April, 1905.*

ENGLISH FOGS AND COMMERCE.—All are more or less familiar with the geographic fact that England, and the English cities, have dense fogs. But few realize their commercial significance. United States Consul Mahin, stationed at Nottingham, gives us a number of interesting items, some new and some familiar to students, concerning such phenomena. The fog becomes most dense after sundown, often gradually melting away toward midday, but occasionally continuing all day. A very thick fog rarely lasts more than two or three days. The first ones come with the autumn frosts, corresponding in time and atmospheric conditions with our Indian summer. The air is very still and the temperature relatively low. Densest fogs are usually in November, but the maximum number of foggy days is in December, then November, January, and October. The average annual number of such days in London is 55—45 from October to March. Clearest months are May-July. Least stormy years are freest; cold and quiet years have most.

It is stated by many authorities that the fog is much aided in formation, as well as intensified, by the presence of dust particles, as those of smoke. Coincident with this comes the statement that the fogs are thinnest and rarest in the months when coal is burned least. It has been pointed out that they increased as the use of coal grew, and that during the last fifteen or twenty years they have become less dense, owing to the more extensive use of electricity and to systematic attempts to abate the smoke nuisance. Hence it appears that they are related to the great industrial development of the cities, and belong more especially to the purely coal-using stage in that evolution.

They seriously interrupt business of all kinds—delay passengers, increase risk, increase help needed, and expense of precautionary measures. Extra labor is employed, and even the pay of engineers and firemen is increased during fog days. Detention of goods and delay in delivery cause loss which often falls on the railroad companies. The moisture damages store goods and furniture, furs and textiles. The death-rate increases and throat and lung troubles are aggravated. The author mentions some discussions and suggestions of means to disperse or partially dissipate fog.—*Consular Report, February, 1905.*

COTTON-GROWING POSSIBILITIES IN THE TROPICAL SECTION OF AUSTRALIA.—At a meeting of the Victorian Branch of the Royal Geographical Society of Australasia in Melbourne (*Victorian Geog. Jour.*, Vol. XXII, 1904) a paper was read by Dr. Thomatis, an Italian resident of Queensland, who has successfully experimented in the hybridization of different species of cotton. He has evolved a marketable type, which he has named *caravonica.* It is asserted that this cotton thrives in a moist, tropical country like Queensland, and promises to be very productive. The *Financier* of London says there is a fair prospect that the cultivation of this cotton will be undertaken on a large scale, not only in Queensland but through the whole tropical territory in the Commonwealth north of 18° S. latitude. The sole difficulty in the way is the restriction imposed on the immigration of colored labor. It is said that, at the low rate of one-third of a bale to the acre, a total of 20,000,000 bales of the fibre may be produced in a year (!).—*Bull. Am. Geog. Soc., April, 1905.*

COMMERCE OF THE UNITED STATES.—The commerce of the United States has increased from 1½ billions in 1880 to 2½ billions of dollars in 1904, while the commerce of the world meantime has increased from 15 billions to 22 billions, the relative increase made by the United States being thus greater than that of the other parts of the world.

The principal mineral products entering into and forming the basis of industry and commerce are coal, pig iron, copper, lead, zinc, petroleum, and the precious metals, and in the production of each of these the United States has shown a wonderful development during the twenty-five years under review. The relative growth in the production of the various basic articles of industry in the United States and the world, respectively, has been in the period from 1880 to 1903: Coal, United States, 251 million tons, entire world, 536 millions; pig iron, United States, 14 million tons, entire world, 28 millions; copper, United States, 284,627 tons, entire world, 459,185 tons; lead (period 1880 to 1900), United States, 154,468 tons, entire world, 654,043 tons, zinc, United States, 121,410 tons, entire world, 331,589 tons; petroleum (1890 to 1903, the longest period for which a comparison is possible), United States, 54 million gallons, entire world, 47 million gallons.

The United States produces 37 per cent. of the world's coal, 39 per cent. of its pig iron, 51 per cent. of its copper, 25 per cent. of its zinc, and 51 per cent. of its petroleum. In the production of coal, pig iron, copper, and petroleum the United States leads the world.—*Cons. Repts.*

HOW WE USE A RAILROAD.—A railroad is not, usually, a desirable adjunct of a school-yard, but we find it of use in several ways.

First, to build the road, a deep cut had to be made through a gravel hill. This cut in itself serves as a cañon or a steep sided valley according to the progress of the work, and the walls, or banks, offer a near field for observing many facts of erosion and deposition. Many simple and involved river systems with falls, rapids and consequent valley features develop during each rainstorm.

Heavy falls of rain furnish torrents which eat into the bank fast and carry large stones long distances. Light storms furnish less water and show less damage to the ground. Then, too, as the streams reach the bottom of the bank and run along the track they illustrate loss of transporting power, and the upbuilding of mud flats, or flood plains, of the finer sand on the floor of the cut. Some streams are found only while water is flowing. Other beds remain deeply marked at all times. Cañons, wearing of divides, broadening of valleys, frost action, the creeping of snow masses down the slopes, miniature glaciers, wind-wearing and mechanical erosion are all to be had for a look out of the windows.

The railroad itself is heavily a freight line. The schoolhouse is situated at the highest point on an "upgrade" of three miles. Long and heavy trains get "stuck" almost daily beneath our windows and have to await the assistance of the next on-coming engine. From this we see some effects of land slopes upon railroading.

The children delight to watch and report the various names of shippers and railroads they find labelled on the freight-cars; also, the different specimens of live stock and manufactured products seen in them.

Then the discussion of "What are the things for?" "Why are they sent back and forth?" "From where do they come?" lead us to see that our "home observation" demands some information of distant parts of the United States and Canada, and the children gradually get a bit of an insight regarding producing areas, and consuming centers, and the industries of agriculture, manufacturing and commerce.

The following lists of freight cars, and visible contents were reported at one class period. They were reported miscellaneously and sorted by the class into food supplies, clothing and building materials. The need for exchange came to light and finding the home of the cars and the time used in getting from point to point enlarged their conception of country.

The Location of the School House

Cars: Canadian Pacific, Pennsylvania, New York, New Haven & Hartford, Lehigh Valley, New York Central & Hudson River, Ohio Valley, Grand Trunk, Lackawanna, Cincinnati Central, "C., B. & Q.," Wabash, Michigan Central, Erie, "New Orleans," South Virginia, "Seattle Lumber," "Armour," New Jersey Central, Pittsburg & Lake Erie, "Anchor Line," Rutland, "Empire Line," Boston & Maine, Maine Central, Minneapolis & St. Louis, Baltimore & Ohio, "Fruit Growers' Express," Texas & Pacific, Great Northern, "Union Line," Chesapeake & Ohio, Père Marquette.

Contents: Milk, stone, cattle, machinery, wood, lumber, boxes, wagons, horses, hay, coal, grain, spring water, pigs, butter, beer, glass, vegetables, oats, ice, wool, sheep, sods, oil, manure, gravel, iron rails, poultry, wheels, logs, coke, shingles and sand.

FOODS	CLOTHES	BUILDING, ETC.
Cattle—milk—butter	Cattle	Stone—wood
Sheep—pigs—poultry	Wool	Lumber—glass
Hay—grain—oats	Sheep	Gravel—iron rails
Vegetables	Poultry (feathers)	Wheels—logs
Spring water		Shingles—sand
Ice		(Sods—oil—coke
Beer		Coal—machinery
(Manure) for gardens		Boxes—wagons—horses)

E. L. PRATT.

A CONVENIENT MATERIAL FOR RELIEF WORK.—In the school-room we are more and more becoming champions of the pedagogical adage that, "The way to learn to do a thing is to do it." We are more and more becoming dissatisfied with talking to the pupil *about* things. On the other hand, we wish the pupil to *see* things for himself; to handle them when that can be done; to make things when it is within the scope of his work to do so. It may be that he will not care a whit for the thing when he has made it, though the teaching now tends toward having things made that may be made of some more or less good use; but the very fact that the pupil makes something imbues him with the feeling that he *can do* things, and that confidence in self-ability is in his after life, "A consummation devoutly to be wished."

The boy who grows up through childhood and youth and into young manhood under the condition of having everything done for him—of having his parents, his friends, his teachers hand over to him ready made, all bargained for, shaped and ready for his personal use everything of that vast assembly of articles and conditions which go to make up his wants—that boy is being hampered for his future activity by not being brought into the action of the developing factors of his boyhood environment.

A boy thus unwisely cared for has had, when he arrives at young manhood, an influence of negation shaping his mental attitude into the way denying him initiative, and he comes to the need for push and energetic activity with a feeling of "Can't"—the greatest curse that blights the field of accomplishment of the clean young man's later life. He never *has* assumed the initiative during the years of his adolescence, when his mind was being shaped into those attitudes which later largely determine his powers of doing things; and when the strenuous life begins in earnest, he not only does not know that he *can* do things, but he thinks that he *cannot,* and upon that attitude hangs much future woe.

If more parents would systematically cultivate self-confidence in their boys and girls by allowing them greater exercise of initiative in such common things of their every day wants as the bargaining for clothing even, and in the many other outlets of personal choice and individual activity; if more teachers would insist upon drilling the pupils' minds into a cheerful and confident attitude toward *belief* in their ability to do things, *with* things themselves, and against being satisfied with merely hearing about things which then seem to be far removed from their actual surroundings into some far off region of semi-reality; if the boy were, at home and in the school, more generally given a fair show for his future welfare by being schooled to grow up familiar with the thought of "I Can," there would be less despondency in the years to come, and the lines of tragedy would fewer of them be written across the face to tell their sad story of struggle with self and failure.

I believe that we are moving in this direction of adopting the doing of things for the sake of impressing the pupil with the character-shaping thoughts of self-power; and to come to my subject, one little item in that schooling is the pupil's exercise in the making of the thousand and one things that are made in wood or clay or paper pulp or what not. One of these things is the relief map. This is made from the relief maps in the geography texts, from the plain maps there found, and from the topography of the pupil's immediate neighborhood, beginning with the simple and easily made portions and grading up into the more and more complex areas.

I am not speaking of this sort of work as something new. It has been done for years; but we don't have enough of it—the general modeling work, I mean, of which this may stand as representative. Good clay is expensive and difficult of attainment for the small school and especially for most of the rural schools. Paper pulp is mussy and is likely to sour and smell badly. The purpose of this article is to suggest the use of something within reach of every teacher; namely, starch and common salt.

By mixing these substances, about half and half, into a paste, a material is obtained for relief modeling that will not become stale, is clean, can be prepared quickly and in small quantity; and when dry, the salt crystals give the work a glistening white appearance that is very pleasing to old and young alike.

In my own work, I procured, at the dry goods stores, some dry goods boards, which I used as the background for the relief work. These boards I sawed in two transversely, thus making two modeling boards out of each. These I painted black and into the middle of the end of each I fastened longitudinally a screw eye for hanging the work up along the wall. The white, glistening work upon the black background makes a very pretty effect. These reliefs may be preserved by coating them with shellac, spread on with a soft brush.

On one occasion, I selected a half dozen of the better ones of the relief of South America, done in the eighth grade, photographed them, and presented the pictures to the pupils. C. C. GRAY, Head of Department of Science, High School, Fargo, N. D.

NECESSARY GEOGRAPHICAL FACTS.—The consequent necessity for selecting the most essential minimum from an excess of useful facts legitimately within the scope of elementary geography, would make any general agreements impossible, were it not for the fact that there is enough material admittedly and conspicuously important to consume in its mastery such time as can be assigned to mechanical drill as distinct from illustration and discussion. It is probably for this reason that certain of the following propositions were almost unanimously approved by the fifty representative school men to whom they were submitted. The facts thus included in the core of the curriculum, however they may be distributed among the grades, should be continually drilled upon from the time they are first introduced until the close of the school course. Other facts may be permanently remembered. These must be.

1. While the general form of the earth as a whole, that is, the outline of continents and oceans in relation to each other—should be presented to pupils before they have mastered the leading facts in the industrial and political geography of the United States, the detailed physiography of the earth as a whole should not be so presented.

2. Physiographic facts should be limited to those necessary to a fair comprehension of industrial and political facts, and should be taught in connection with the facts they serve to explain, rather than as introductory to industrial and political geography.

3. Pupils should be required to be so familiar with the outline of the various states of the Union that they can recognize them by their form at a glance.

4. With regard to the general outline of leading countries outside of the United States, the ability to name those adjacent to each other is all that should be required. With minor countries only the general location should be clearly determined, as in western Asia, in Central America, etc.

5. In comparing areas of states or countries no more exact knowledge should be required than that which results from the visual comparison possible when drawn upon the same scale. Some one state in the Union, as Pennsylvania, may be used as the basis of comparison between states or

smaller countries, and the United States may serve in a general way for comparison with larger countries.

6. The capital of each American state and of important countries outside of the United States should be required, but not its exact location unless otherwise important. The capitals of minor countries should not be required.

7. A specified and limited number of cities, other than capitals, should be taught, but only such as have pre-eminent characteristics, which should be associated with their names and locations. Exact location is not necessary except in cases of ports upon proper bodies of water. Other cities, where possible, should be located in particular industrial sections, such as the coal regions, the wheat belt, etc.

8. Only those products of a country should be required which are most characteristic, or are responsible for American imports or exports. With such products should be associated the natural and social conditions which make them possible, so far as they are within the ready comprehension of the pupils.

9. The forms of government should be taught as compared with distinctive models, thus making prominent essential or characteristic features only.—*Penn. School Journal.*

BUDAPEST

The beautiful capital of Hungary is—barring St. Petersburg—the most disturbed urban center in Europe to-day. For many moons the keen eyes of journalists and diplomatists have been focused upon its Magyar Parliament, to see what new form of impassioned outbreak the legislators may indulge in. In their displeasure recently at Premier Tisza, a faction broke up the desks and chairs, wrecked the choice furniture of the platform, tore in pieces the bills under consideration, and hung the effigy of the Prime Minister—all a rather rich spectacle of fury by what is called by courtesy a deliberative body.

The Hungarians are nothing if not intense. And the race jealousies of the Magyars, Germans, Austrians, Croatians, that make up the conglomerate population, find their most eruptive expression in the legislative chamber of the capital. Everybody from noble to scullion discusses freely and passionately the present unwelcome union with Austria, and prophesies of what may occur when the present representative of Hapsburg rule shall have paid the debt to nature.

Budapest is among the finest and most attractive of European capitals. It is really a twin city, as New York and Brooklyn. Buda is on the right bank of the Danube, and Pesth on the left. They became one city in 1872; and the sign of their union is the glorious suspension bridge 1,272 feet long, and that cost $2,300,000. Two other great bridges arch the swift flowing river, and scores of ferries ply between the opposite banks.

The topography of the two segments of the city is singularly different. Buda is built on a series of bluffs and high hills, that furnish the choicest sites for chateaus, imperial palaces, and fortresses. Pesth is built on a low, level, sandy plain, that is in constant danger of inundation when the snows of the Tyrolese mountains are suddenly melted, and thrown into the channel of the mighty stream. Incalculable damage was done the city by a flood in 1838, when thousands of dwellings were swept away, and a myriad people lost their lives.

The population of the two segments differs very materially, both in numbers and character. In 1900, the city was credited with 510,000 inhabitants, of which Buda had about one-fifth, and Pesth four-fifths. Buda is quiet, conservative, and inclined to be aristocratic. Court retainers and army officers are largely responsible for its tone. Pesth is a bustling, progressive, and more democratic city. It is not without its palaces of the Hungarian nobles, but its chief feature is the multitude of middle-class homes. It has spacious streets, some 100 to 150 feet wide, and paved either with wooden blocks or asphalt.

One of the most pleasing sights is the great boulevard along either bank of the river. Two rows of beautiful acacia trees run the entire length of each boulevard, and a spring or summer evening stroll along these avenues, when the myriad lights are gleaming amid the tender foliage, and the stars are reflected in the mirror of the river, is pronounced by tourists as nearly akin to paradise as anything earth can afford.

While Buda has the royal palace with its hanging gardens, dating from the days of Maria Theresa; its grim, grey fortress; its fine churches and synagogue; and its great dockyards of the Danube Steam Navigation Company; yet Pesth wears the palm for its magnificent structures. Back of its boulevard, and paralleling the river for two and a half miles, are handsome and massive stone buildings that it would be difficult for any other European city to match. Some of these are great warehouses, wholesale business houses, a peculiarly imposing custom house, and, finer than all, the Hungarian houses of Parliament. St. Leopold's church, and the Jewish synagogue in Pesth are the finest ecclesiastical buildings in Hungary.—*The Journal of Education.*

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MAP READING

BY ROBERT MARSHALL BROWN
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THE introductory quotation in a recent number of this Journal[1] emphasized the study of maps. It is worth reviewing.

"In geography we are constantly using maps; and upon them must be based a necessarily large part of our work in geography. So proper education in geography must include a careful training in the making and interpretation of maps. More and more a map is coming to be a shorthand representation of a mass of geographical information, and more than ever a good geographer is able to read a chapter from a map. A pupil needs to learn the language of maps, then to memorize some of the essays and sketches set forth in the map's language. To do this is an exercise of attention and retention, and, studied in this way, the continents become as easy as so many letters in the alphabet—learned once, learned forever." We are slowly outgrowing the practice that involved the learning of a long list of unrelated names of capitals of states or countries, names of rivers and mountains, bays, capes and the like. Many teachers may insist that the old order has entirely passed away, nevertheless, it is essentially and persistently retained in much of the teaching, especially when the subject matter of instruction concerns lands other than our own. The misuse or too frequent use of the text book makes the teaching forced and uninteresting. The development of home geography within recent years enables us to take a long stride forward. The study of home geography should not be confined to the limits of any one or two grades but by constant field exercises it should be made to enrich all the later work in the subject. Many studies have to be cut into portions to suit the mental capacity of the pupils of the different grades. In this way, the continuity of a subject is apt to be broken. If the home geography is relegated to a certain grade, and if in a succeeding grade the study of one of the grand divisions, as Eurasia, occupies all of the time to the neglect of out-door observation, the work must largely be done in the old way and without much aid from home geography. The pupil will not be in intimate touch with the subject as presented in earlier grades, and little use is made of the instruction of these grades. Yet a study of Eurasia can hardly be considered anything but visionary, if the concepts gained from the study of home geography are slightingly considered. The object of the insistence upon the study of types has this thing in view, namely, to furnish the mind with some units of measurement which are to be the standards for future judgments. Such articles as "A Temporary Sahara"[1] probably finds its inspiration in this idea. Some work of this nature is done, as for instance, the determination of the rainfall under the control of wind direction and topography. In most cases, however, the rational treatment is incidental, and forms no part of the working plan. The opportunity for an increase of the rational or development plan is obvious. With a wealth of data derived from the study of home conditions many features of another country may be approximated in vision. Such work will mean a distinct gain in clearness and accuracy of thought because of the foundation on which it is built. Not to apply the lessons of the home study to other lands is to isolate, make fictitious, the distant places. The present paper is a continuation of a previous article by the author[2] and an elaboration of a scheme of map work that has stood the test of trial. The outline of this article is not a course to be followed as narrated. It is rather a somewhat severe expression of an idea that should yield suggestions for the different stages of the work of map reading. In each case the application of the principles of home study is the agent. If each of the grand divisions is studied with some reference to a plan of this nature, the repetition involved will be found to be excellent drill work.

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[1] J. P. Goode, Jour. of Geog. III, 2, opp. p. 35.

The maps which accompany this paper are ten in number and are briefly catalogued as follows:

1. Outline map, with parallels and meridians. The map may be on any projection. However, it is advisable to shun the Mercator projection and its modifications for the sake of emphasis on direction, and in order that early practice may be gained in treating north and south directions as coincident with meridians, and east and west with parallels.
2. Topographic map, showing three degrees of elevation.
3. Wind chart for July.
4. Wind chart for January. These wind charts mark the average extreme of the seasons and the average limits of the migration of the wind belts.

[1] Jour. of School Geog. IV, 171.

[2] Map Making and Map Reading. Jour. of Geog. III, 65.

5. Rainfall map.

6. Soil map. Under this head is included minerals. This map offers a great variety of materials from which to choose. Its use must depend more largely than the preceding maps upon individual conditions of mind and time. Here it will be employed very fully, if indeed, its use is not carried too far.

7. Map of vegetation. This map may also be expanded according to desire. Maps of different products may be used. In this instance the map shows the degrees of luxuriance rather than kinds of vegetation.

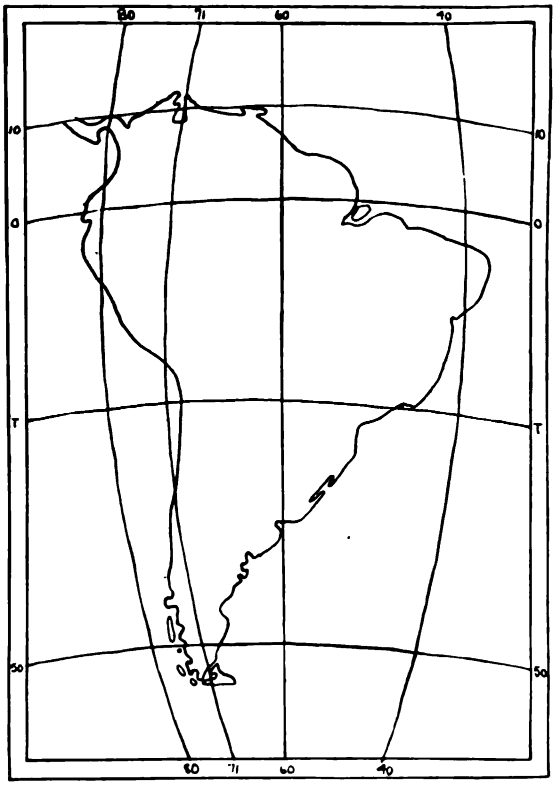

Fig. 1. Outline map.

8. Map of Animals, showing the range of domestic animals.

9. Map of Commerce. A map of degrees of commercial development and indicating future possibilities in this direction, with important railroads and sailing routes.

10. Map of Population, showing density.

These maps may be made easily from a stencil or by sketching upon heavy paper, and mounted for wall use. If a crayon pencil is used for drawing the lines and for coloring the maps they may be read in all parts of a school room. A legend should be added to each map and care should be taken to make this legend as legible as the map itself.

The Specific case. South America.

1. Given an outline map (Fig. I) of South America, with the parallels and the meridians. The position of the country may be decided. As an aid to the location the meridian of the home, in this case, Worcester, approximately 71 degrees west longitude, may be entered on the map. The proportion of South America to the east of this meridian is noted and the fact furnishes a basis for a few simple problems in longitude and time. When it is noon in Worcester (75th meridian time), what is the time (local) at Cape St. Roque? The parallels may be used: A. In reference

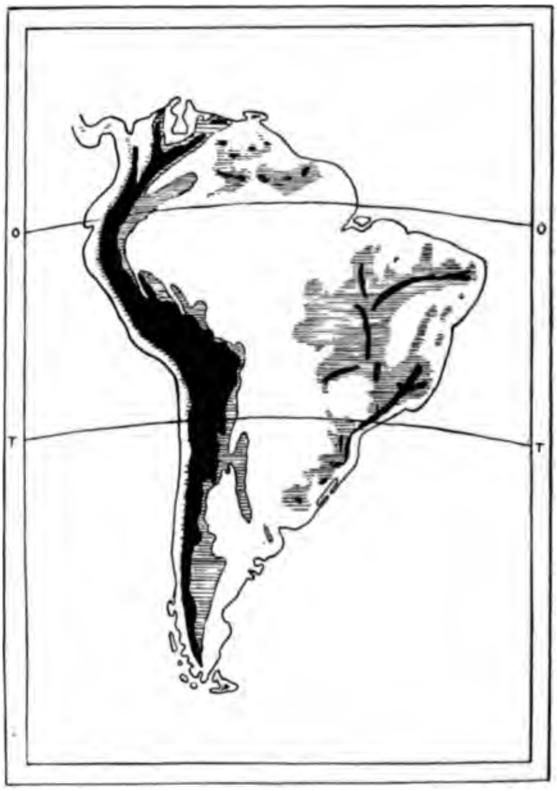

Fig. II. Topography map. ■ Highlands, above 2000 feet. —— Uplands. □ Lowlands. (After Redway and Hinman).

to location. What portion of South America is within the tropics? What place in North America corresponds in latitude with the southern extremity of South America? B. In reference to the position of the sun. At noon on the days of the equinoxes what is the position of the sun to an observer at the southern extremity of the country? On the day of the summer solstice? On the day of the winter solstice? C. In reference to climate. The consideration is merely latitudinal control or sun insolation. The statements must be very general and be of such a nature that a modification under the other climatic controls can be made easily and without a sense of the futility of the general statement. Here also may be emphasized the large percentage of the country under the direct rays of the sun in sharp contrast with North America.

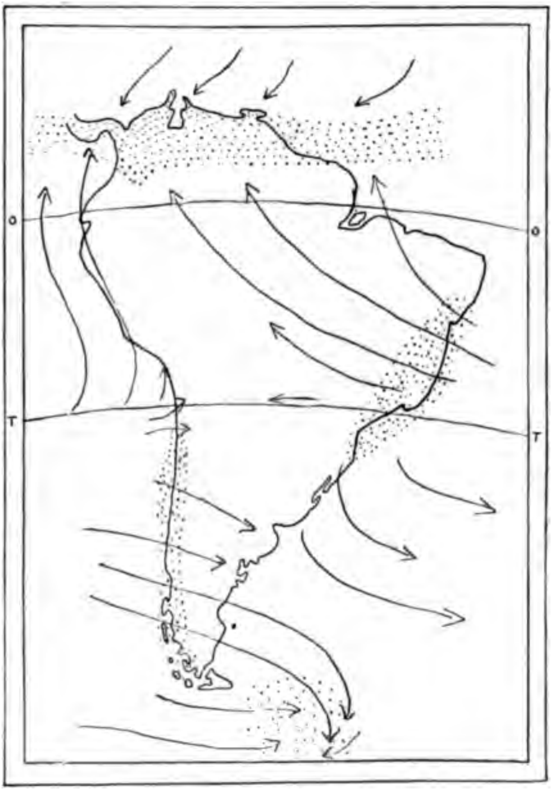

Fig. III. Wind map for July. Arrows fly with the wind. Dotted areas show ascending currents. (After Davis).

A journey in fact or fancy taken along a meridian in North America discloses the idea of increasing luxuriance of vegetation as one goes southward and a diminishing amount as one journeys to the north. Thus low latitudes may be inferred to foster the luxuriant growths and high latitudes a lesser and lesser amount. A first general consideration along this line paves the way to a fundamental conception of the vegetation of South America. So in like manner a heavier rainfall may be expected in the low latitudes than in the places more distant from the equator.

From the outline of the country two questions are suggested. The first has to do with harbors, population and commerce. The very limited harborage of the western coast and the few along the Atlantic coast may mean little commerce, or the concentration of commerce at few localities. Under the latter consideration the commerce is light or congested. A statement left undecided or an alternative to be settled by subsequent knowledge, with judicious handling, often incites the pupil to an eager anticipation of future lessons. A second question arises concerning the southwestern coast

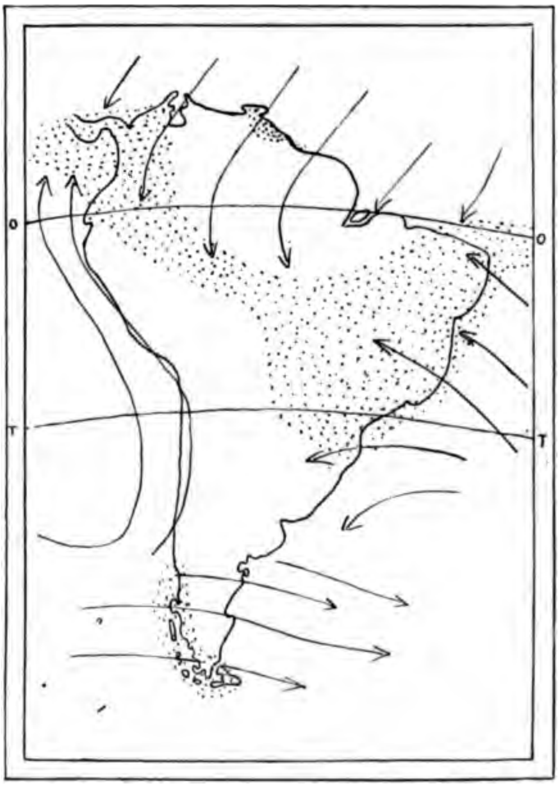

Fig. IV. Wind map for January. Arrows fly with the wind. Dotted areas show ascending currents. (After Davis).

line. A likeness to the irregular coast line of Maine is suggested, and a similarity of origin may be inferred.

2. Add to the data of map I, the topographical map (Fig. II). The study of the home conditions has shown the effect of altitude upon climate. We may now strengthen certain points left in suspense while studying map I. The continually changing aspect of the work may seem at first glance an objection to the scheme, but it is nothing more than the evolutionary process experienced in all our growth. To present South America with all its features, topography, drainage, wind, rainfall and culture, is to confuse with the multiplicity of new ideas. The advantage in a developing set of maps of a continent is not alone the emphasis on special features, but better still the interdependence of physical conditions and the consequent modification of the different controls which shape the continental life.

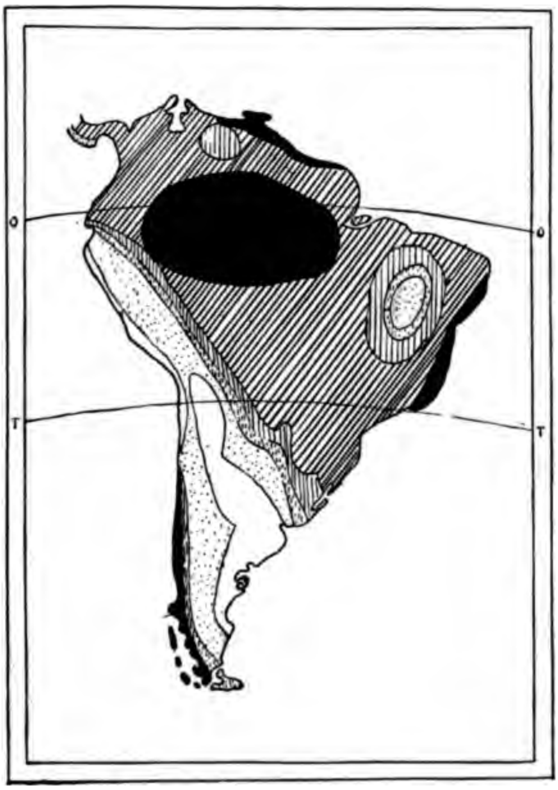

Fig. V. Rainfall map. ■ Over 80 in. //// Over 40 in. |||| Over 30 in. ˌ'ˌ'ˌ' Over 20 in. ☐ Under 10 in. (After Mill).
:::: Over 10 in.

The very general statement concerning climate obtained from the consideration of latitude circles may now be modified. The height of the Andes, and of the Brazilian and Guiana highlands in the equatorial regions suggest a more temperate climate in those parts, while the culminating portions of these ranges of mountains may be thought of as having a cold climate. The change from the highest equatorial Andes to the Southern Andean heights may be paralleled in kind in North America.

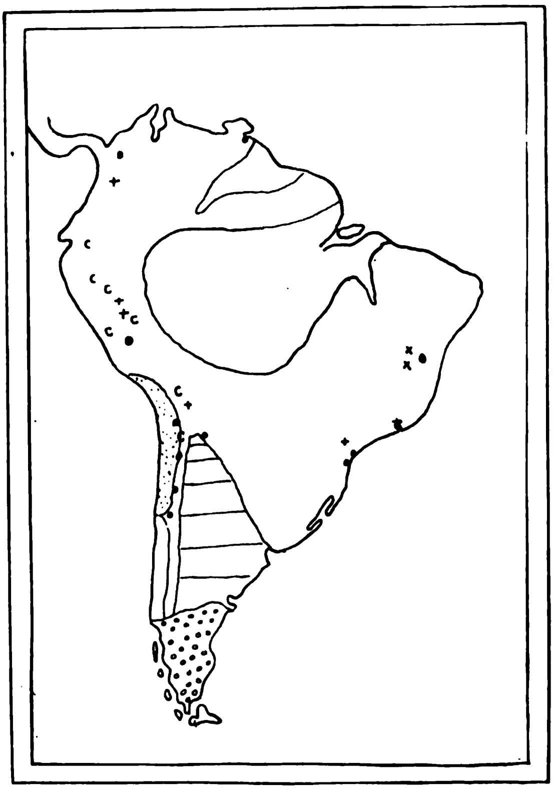

Fig. VI. Soil and Mineral map. ☐ Recent alluvium. ooo Diluvium. :::: Sand. ═ Loam and Loess. Diamond. ● Iron. + Gold. C Silver.

If any connection has been made between altitude and rainfall an approximation of the conditions of rainfall may be attempted, and even the wind charts will introduce a new feature. The vegetation is now confined to a smaller area inasmuch as the highest portions of the mountains, like high latitudes, are not localities of much vegetation.

It is necessary to step aside at this point to show that inasmuch as vegetation depends largely on rainfall and since the rainfall has been considered, the statement for vegetation might be further modified. Such a step, however, would defeat the purpose in view. The map under consideration, the topographic map, is to be followed and the modifications due to topography considered. The rainfall was discussed from the standpoint of altitude and the vegetation must be considered in like manner. To discuss the vegetation from the viewpoint of the rainfall hypothecated from the topographical map is to base our reasoning on a portion of the truth and not the entire truth. Such a step would be dangerous.

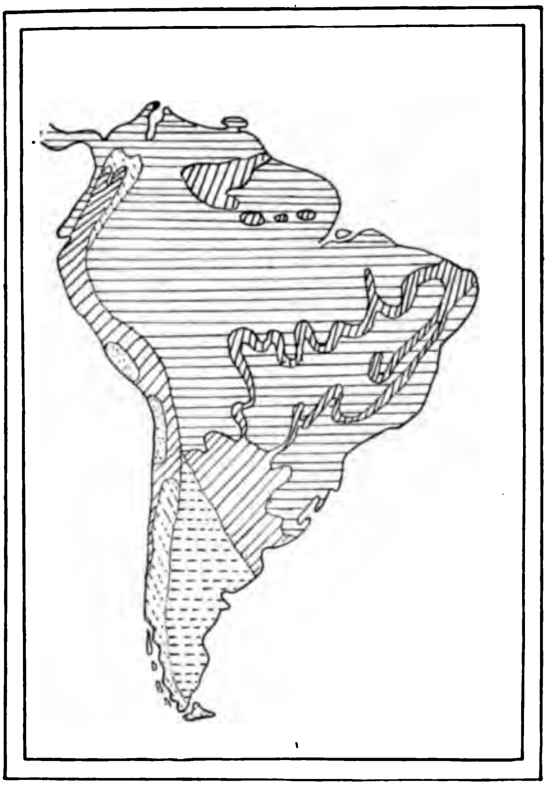

Fig. VII. Vegetation map. Chief condition of vegetation.
Tropical and Subtropical. //// Grassy plains. ‾ Forest and Cultivable lands.
Temperate. ',',' Prevailing fir and pine trees. ----- Grassland cultivable. Part needs irrigation.
·::: Desert Regions. (After Adams).

The division of South America by the Andes into a narrow western portion and a broader eastern portion offers some basis for the consideration of the distribution of population. In this instance as in the others the plan is to gain our conclusion from the discussion of the map in hand and the previous data, independent of what may be the final decision when all the data is at hand. In a way an analysis of the controls is made. Whereas it is not only possible but most convenient for population to collect in spots favored by harborage and open by easy journeys to large areas, yet when the last thing has been said it will be found that the gratification of the desires of mankind may dictate a habitation in localities in spite of their many disqualifying physical features. It is claimed that a weighing of the convenient and the usual will bring into strong relief man's departure from easy paths when such cases are discovered. We may note in passing that the presence of the mountains in the southern part of the grand division may strengthen

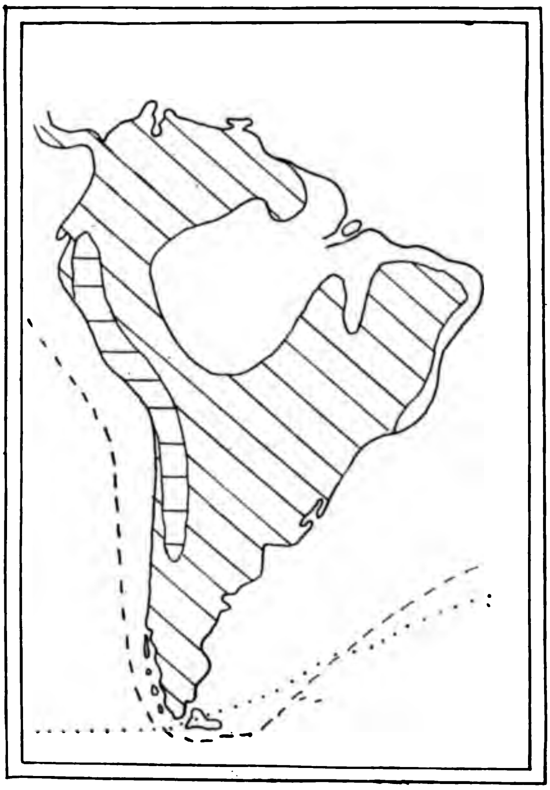

Fig. VIII. Animal map. Range of Domestic animals. ╲╲╲ Horse.
═══ Llama and Alpaca. — — Southern limit of sheep.
···· Southern limit of cattle. (After Adams).

the contention in regard to glaciation deduced from the irregular southwestern coast line.

3. To the data already presented add the wind maps (Figs. III and IV), showing the distribution of the winds for January and July.

The process of elimination and reasoning continues. Where the winds blow from water over the land the expectation is a modified climate. If the wind strikes against a mountain slope and is forced to rise rainfall results.

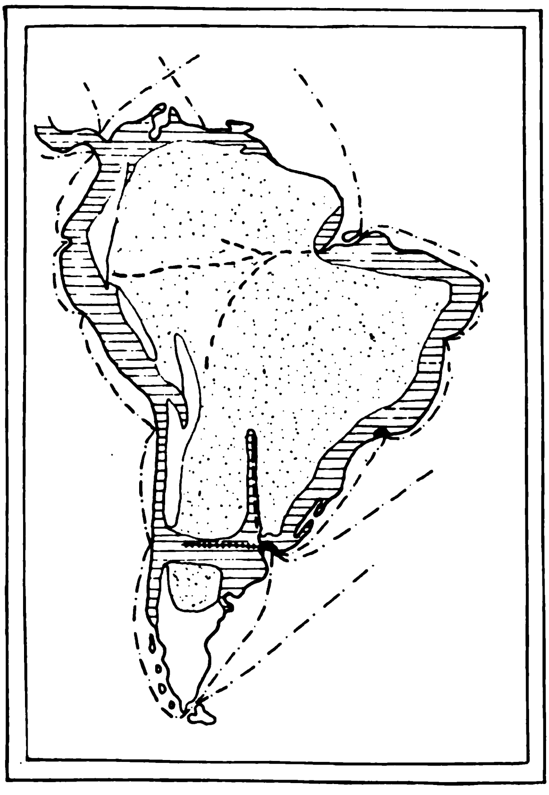

Fig. IX. Commercial map. ☐ Deserts or unproductive regions. ∴∵. Regions commercially undeveloped. ☰ Regions of important commerce. ■ Regions of largest commerce. (After Adams).
— · — · — Steamer lines. ———— Rivers navigable for river steamers. -┼-┼-┼ Railroad.

The winds that blow across the country without coming in contact with great slopes carry with them more moderate conditions, so that it is the experience that climates otherwise oppressive because of the latitudinal and topographic controls, become more bearable. The ascending air columns are regions of low barometer because of the increment of motion upwards.

As the ascending air column, because of cooling, increases in relative hun ity rain is the usual result. Where the prevailing wind blows from w across the land a region of continual rainfall is the experience. If two gions as in southern Chile and Guiana, in different latitudes, are under control, it may be expected that the latitudinal control will yield the

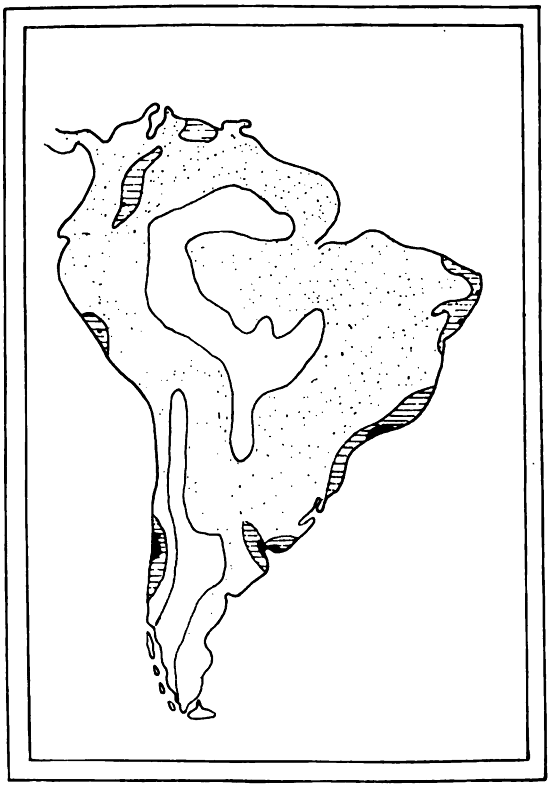

Fig. X. Population map. Density of population. ☐ Less than 1 per sq. mile. :::: 1-25 per sq. mile. ═ 25-125 per sq. mile. ■ 125-500 per sq. mile. ● Cities of over 100,000. (After Tarr and McMurry).

cision as to which shall have the greater quantity of rainfall. On the o hand when the winds blow over the land, or from the land to the water conditions for aridity are obtained. Thus we may approximately locate Atacama desert region. Furthermore, if the mountains are high enougl intercept a prevailing wind the leeward side of the range will in all p ability be under varying degrees of aridity, as is the case with much of gentina. A comparison of the two maps, III and IV, easily leads one to the migration belts. The South American country may be divided into regions, one under a prevailing wind throughout the year and the other under one wind for a part of the year and under another for the remainder of the year. The seasons under the influence of this migration may be much more nearly approximated from a diagrammatic chart of wind direction than from the sweeping statement that South America has "a wet and dry season." The process of acquiring this idea is the educational function which far outweighs in value the crude fact. The rational process is too often missing from a geography lesson; it is easier to cram with data which are asserted as true, than to labor through a process of reasoning, especially if the teacher is not quite sure that the reasoning process will not contradict her list of facts, which are her eternal verities.

4. The data has so accumulated that a very near approach to a rainfall map may be drawn. The map (Fig. V) is the next one to be presented and the variations from the anticipated may be noted and perhaps considered. Many queries arise. In regard to vegetation: Where are the localities of luxuriant growth? of more comfortable growth? of scanty vegetation? The conditions of living in regions of luxuriant vegetation are so marked that a discussion will lead to the density and to some degree to the state of civilization.

Nothing has been said up to this time about rivers. Rivers as the carvers, to a large degree, of land forms would perhaps naturally precede the consideration of topography. For the needs of this discussion the logical historical order cannot be followed. In the earlier years of instruction we must study the land surface as we find it. So with the topography and the rainfall a consideration of rivers is possible. It will be obvious to the pupils that on the western slopes the streams must be short and in the region of the drying winds a scarcity of rivers may be expected. The larger rivers of the eastern continental slope and the smaller streams of the secondary highlands follow as a natural consequence. The more arid regions of Argentina will furnish the cue to the rivers of that locality. The ordinary physical wall map, showing the rivers may now be presented for verification.

5. Enough data have been given so that the remaining maps may be constructed, and the true map displayed at the end of the exercise rather than at the beginning. The reasons for the errors in the constructed map may serve as a quest which will reveal new information. So we are to construct the soil map. From the topography and rivers locate the alluvial lands. From the wind charts locate the sandy regions. From the winds and rainfall locate loess. From the rainfall map locate salt. From the outline and topography locate diluvium. Under the soil map is included minerals. There may be added by conventional signs as large a variety of these

as suits the individual judgment. There is some connection between mountains and mining so that a first statement might locate the possible localities for minerals from the topographical map. The soil map (Fig. VI) may now be displayed and the deductions verified.

6. The topography, rainfall and soil maps have already furnished considerable data for the discussion of vegetation. If the result is expressed upon a map and then the vegetation map (Fig. VII) (showing luxuriance) is displayed and the same process of comparison used, the experiment should yield something of value.

Another side of the vegetation story may be introduced. If for instance we know the conditions under which rice grows, then the rice yielding portions of South America may be considered. On the other hand, the story may be approached from the following point of view: Rice requires 60 to 80 degrees for ripening and is grown on irrigable land. What localities in South America satisfy the above conditions? After a decision is reached the facts in the case should be made known. The judgment may be faulty because there has been an error in the pupil's mind concerning the climate; because the land has been given over to another product; because of the unsettled condition of the government; or for some other cause discoverable or otherwise. So in like manner a number of staples may be used. Sugar cane requires rich, moist soil, practically no frost, even in winter, prefers the vicinity of the sea. Cotton requires a long warm summer, some rain, rather fertile soil. Wheat requires a mean summer temperature of 57 degrees, plenty of sun. This list may be expanded easily.

7. It is not easy to locate within limits native animals because of the migratory habits. At the same time certain definite conditions control much of the animal life. The influence of man is so marked upon this life that he must be counted the most important modifying influence. In a way the native animal life may be approached in the same fashion as the vegetable life. In many cases one of the requirements will be the absence of civilization. The vegetation, the soil, the topography and the climate furnish a starting point. The home study may yield a basal notion which, though crude, is acceptable as perhaps one of the best available. The life of a swamp is known to differ from the soil of a hillside. The swamp life is apt to be largely reptilian. If trees abound in a large swamp any life not of the swamp itself must be arboreal. So we question what sort of life may be expected on the plains, in the forest tracts and on the mountain heights.

Following the same method used under vegetation, certain type species may be selected and their conditions of living noted. Similar conditions may be found in the country studied. The text-book may properly be used for correction when the conclusions have been drawn.

For the domesticated animals the process is a little more definite. Grazing is often carried on in uplands, among mountains and on plains where the rainfall is insufficient for agriculture. Certain localities in South America may be selected as suitable for grazing. It is not supposable that the truth will be reached from a reasoning process at every stage. The object in each step is twofold. In this instance, if we are sure of the right conditions under which grazing thrives then the discussion puts upon trial the previous judgment concerning climate, topography, etc., while there has been located the grazing regions through the same processes that caused them to develop.

8. Commerce and population are interrelated to such an extent that it is not easy to place one before the other in discussion. The decision in this paper is to consider the commercial map before the map of population, although one implies the other, and finally to sum up under both the topics that are not easily separated. The regions of densest commerce and the regions of commercial possibilities may be approximated and a very near approach to a commercial map constructed. What statements concerning commerce could be made from a study of a soil map? How would a study of the rainfall map modify these statements? Would the topographic map give any hint concerning commerce? How far might the outline map indicate centers of commercial activity? Under what conditions and where in South America do the outline and the winds hinder commercial development? Under what conditions and where is it aided by these controls? Questions which relate to vegetation and animal life may follow and then later the commercial map (Fig. VIII) may be presented and considered.

In any discussion of population, the consideration is based on the desires of mankind and presupposes that people will live where there is something to live for more or less independent of risks. It may assume a slight knowledge of the climatic effects upon life. Why were the native mountain tribes—the Incas—more highly developed than the valley tribes—the Caribs, for instance? What effects will climate (the resultant of the first four maps), have upon the state of civilization? How far will any one map, as the soil map, explain the Spanish conquest? The commercial map is almost the population map. The outline map may aid in locating cities.

The centers of population and commerce, the cities, may now be considered. Explain Rio Janeiro. Using each of the preceding maps does any one or ones above the others indicate a reason for its growth? Work out a similar scheme for Buenos Aires. Iquique offers a new situation. The outline map suggests nothing and the winds are not favorable to the location of a city at this place. There is the conclusion that places may develop in spite of harborage and in the face of unfavorable winds.

The above plan of map reading is carried out in detail under some headings while under others suggestions only are made. There is scarcely a limit to the expansion of such an idea. In part the article will offer nothing new. The study of maps and the extent of map work is largely the outcome of the individual decision of the teacher. It cannot be done safely by a teacher who approaches the task in uncertainty. Much more than is here presented may be done by a teacher sure of her steps and careful of her decisions. Some of it should certainly be woven here and there into the study of the grand divisions.

FIELD WORK IN GEOGRAPHY

BY ARTHUR P. IRVING
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THESE trips by classes of the Springfield, Mass., schools have been found very attractive and profitable. No attempt is here made to designate the schools that took the trips.

A ninth grade class walked a mile or more after school one day to the Connecticut River. There was an unusual amount of snow on the ground and the ice was just beginning to soften. Everything indicated a freshet in a few days. The pupils observed the conditions and got all the preliminary data for a study of the annual rush of water. For several days the newspapers were watched to learn of the progress of the river and a new interest was awakened. Unfortunately for this study the snow melted gradually and the river never made so little fuss over its spring duty.

At another season a ninth grade left the school at 3 o'clock. The street railway allowed half fare so the class of forty pupils went to the lower end of the city. The river had begun to drop from its high water mark. A special study was made of the muddy current and of deposit. Fertile fields along the river were shown as a result of this deposit. A long bridge over the river at this point offered a fine opportunity for observation. This trip took about two hours and cost five cents apiece.

One Saturday in June the class of eighty or more had a geographical picnic. A ride of twelve miles on the electrics brought us to the foot of a range of hills known as the Wilbraham Mountains. The walk from there up to the top of the range, 900 feet high, was merry with the joy of being out in the free country. The day was spent in a large grove of chestnut trees. A great variety of flowers were picked and the woods were thoroughly explored. The search for a spring for drinking purposes revealed many facts about drainage. The chief purpose of this trip was to show the pupils the broad expanse of the Connecticut Valley and to make real to them high and low land. It was also noticeable that the soil upon the heights was very thin and full of ledges while that about our homes is sandy. A ridge of trap rock that cuts across the valley above Holyoke was clearly seen. Perhaps the best lesson of the day was the very strong wind that blew up from the valley all day. This was to strong that the lunch had to be eaten in a sheltered place. When the descent into the valley was made a quiet condition of the atmosphere was found. This was a great day for the children. The expense was twenty cents apiece. Contour maps of the section were taken along.

Trolley rides by different schools are common here. Often the object is simply for pleasure but usually there is a definite object in view. A very efficient system of electrics makes it possible to go all over the valley and view at little cost many points of geographical value. The most ambitious trip of this sort has been made yearly for three years by seventh grade pupils from three different schools. The trip is thirty-three miles in length and is full of historical and geographical interest. Two large cars are filled. The principal of one of the schools has charge of a car, an appointed monitor is at the outside end of the seat and every other detail is carefully worked out beforehand. A start is made from the city at eight o'clock. After crossing the river two or three times the party halts for dinner at the foot of Sugarloaf Mountain, a sandstone bluff. The lunch has been brought by the children in boxes. A wait is made here long enough to allow all to climb the mountain and get a good view of the river and country. The rest of the trip is of historical interest chiefly. Old Deerfield, famous in Indian wars, is thoroughly inspected just at a time in the lives of the children when it means the most. A total ride of sixty-six miles on the electrics and the care of the large crowds of children is a feat that most of us shrink from. But it has been done for three years without a mishap and seems to have become a fixed thing in the school program. The cost to the children is fifty cents.

Attempts have been made to have an excursion down the river to salt water. This means a trip on the steam cars and on a boat but as yet the transportation rates are prohibitive.

A map is the best and most accurate means of expressing certain geographic facts. Children should learn to read a map as readily as a newspaper, that they may use maps intelligently in later years.

ILLUSTRATION OF TIDES BY WAVES

BY W. M. DAVIS
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SEVERAL years ago I contributed an article to this JOURNAL on the relations of "Waves and Tides" (Vol. II, 1898, p. 122-132).[1] A return is now made to the same subject in order to suggest a method of illustrating the phenomena of tides by the movements as waves, as they are seen on an irregular coast, such as that of New England.

Figure 1 represents a small cove, 100 or more feet in length and 30 or 40 in breadth, enclosed by rocky walls, with a pebbly or sandy beach at its head. A wave of moderate size, not the result of local wind, but of a storm perhaps hundreds of miles away, is sweeping into the cove. The period of the waves may be from 5 to 8 seconds. A wave crest is seen at F, a wave trough at D, another crest at B. The movement of the water in the different parts of the wave is recognized by the movement of floating bodies or of seaweed; and thus one may easily detect the difference between wave progress, persistently in one direction at a relatively high speed, and orbital wave motion, back and forth, up and down, at small speed. Arrows at the wave crests, F and B, show the water there is moving towards the cove head, while in the wave trough, D, it is moving from the cove head. The orbits are dotted at F, D, and B, and should be imagined as standing in vertical planes (not as lying on the water surface). The increase in the size of the orbital movement toward the head of the cove may be easily noticed. At a point on the front of the wave, as at C, the water is for a moment rising without forward or backward motion; at a point on the back of a wave, as at E or A, the water is for the moment sinking, without forward or backward motion.

The condition of things a few seconds—half a wave period—later is shown in figure 2, when crest and trough have changed places, and with this all the orbital motions are rearranged. The beach is now flooded with the advancing wave, while a few seconds before it was laid bare.

While these phenomena are considered in their actual relations, as waves, they should be examined in three ways. First, a single wave should be followed as its flat crest comes into the cove, advances towards its head, and swashes up the little beach; thus the progress of the wave up the cove is clearly seen. Second, the water at a single point should be closely observed, as at B, where a small float may be placed; thus the orbital movement of the water in the passing waves becomes clear. Third, and most instructive in the present connection, the changes in the height and movement of the water at a single point on the shore should be watched; for thus the phenomena ordinarily associated with tides will be seen in miniature. At H, for example, the water in Figure 1 stands high, with a movement to the right; while in Figure 2 the water at the same point stands low, with a movement to the left. These features are best seen in calm weather, when the incoming swell makes a wave that has a rise of not more than two or three inches, with a period of six or eight seconds. Then the orbital movement will be of greater dimensions horizontally than vertically, as it should be for the illustration here intended.

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[1] Errata in the previous article: p. 129, 8th line from bottom, for "rise and fall," read "rise than fall."

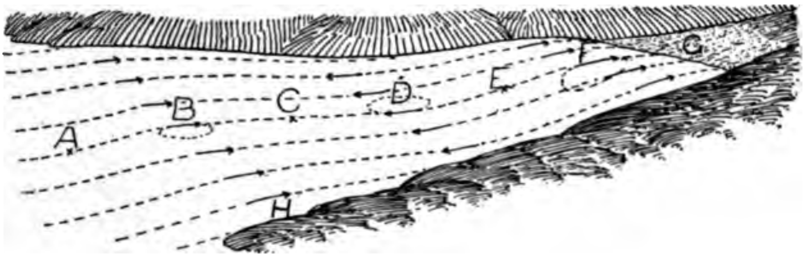

Fig. 1.

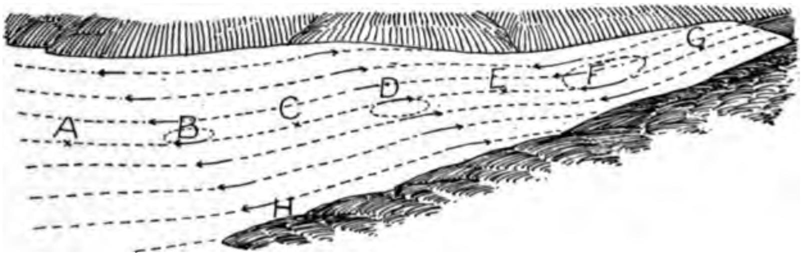

Fig. 2.

Now in order to translate these wave phenomena into tidal phenomena, we must imagine ourselves reduced to very small dimensions, so that if we should stand at H on the shore of the little cove, it would seem to be a great bay, 50 or 100 miles long. Then, as the crest of a wave passed, as in Figure 1, we should note the occurrence of high water and flood tide together; and afterwards, as in figure 2, the occurrence of low water and of ebb tide together; while between these two observations there would be moments of slack water—that is, of no horizontal current—but of rapidly falling or rising water. Thus the ordinary relations of high and low water, of flood and ebb currents, and of rising and falling slack water are all made clear. It is important to remember that these relations obtain, as thus exhibited, at most points on the ocean shores.

If we place ourselves at the head of the bay, another and more special relation will be found. There the water rises with flood current from low tide to high tide; and falls with ebb current from high tide to low tide; and the moments of slack water have neither flood nor ebb, neither rise nor fall. But it is evidently only at a bay head that this peculiar and deformed relation can obtain. Everywhere on the ocean shore or on the side of a large bay, like the Chesapeake, where the tidal wave sweeps past the observer's station on the way to some other point, the more normal relation of high tide with flood current, and of low water with ebb current will be observed. Inasmuch as there is a widespread misapprehension on this subject, it is well that it should be cleared up by simple observational means, such as are here suggested.

There are various other peculiar tidal phenomena that may be illustrated in the same miniature fashion, by choosing shore form and wave strength of appropriate relations. If the incoming waves are very gentle, the wave front may advance up the beach at the head of the cove (or bay), without breaking or foaming; and this corresponds to the ordinary condition of tidal rise and fall, causing an advance and recession on the shore. But with stronger waves, the advancing water front at the bay head rolls over itself in a frothy excitement, and the rise of the water as the wave advances is more rapid than the following fall; this illustrates fairly well the phenomena of the tidal bore, such as takes place in the estuary of the Seine in northwestern France, in the Severn estuary at the head of the Bristol channel in England, in the Petitcodiac estuary of the Bay of Fundy, and at various other parts of the world.

If a cove of appropriate form and size be found, the advancing wave may be transformed into a standing wave within the cove; here the crest stands and sinks to the trough, while the inner or bay-head part of the wave simply swings up and down, in such fashion that all parts of the shore line have high water or low water at the same time; this being the condition of the tides in the Bay of Fundy. If slender branches or creeks open from such a cove, they may illustrate the phenomena of the Petitcodiac estuary, just mentioned; they will be suddenly invaded by an advancing and foaming water-front and left empty (except for local drainage) after the tide has slowly receded. An ordinary accompaniment of this sort of tide is a great exaggeration of the tidal range at the head of the bay; the water there is alternately much higher and much lower than the mean water level outside of the bay.

If a cove is found with a very narrow and shallow entrance, then the range of wave (or tide) rise and fall within the bay will be much smaller than outside of the bay; while strong currents, alternately inward and outward, will run through the entrance. In special cases where the entrance has a rocky sill, the alternating tidal currents may assume the peculiar form of rapids or water-falls, now pouring into the bay, now pouring out, as is the case at St. John, New Brunswick.

If a narrow water passage, or "sound," lies behind an island, the waves will reach the sound from two sides; and according to the length, breadth and depth of the water passages that lead to the two ends of the sound, the waves (or tides) arriving there will differ in strength and in phase. If the tides are about alike in strength and phase, the water in the sound will rise and fall, without strong currents in either direction; but if the waves (or tides) reach the sound in opposite phase—high water from one side arriving from one side when low water arrives from the other—then a rushing current will sweep through the sound, back and forth, in its effort to equalize the inequality of the water level; thus are explained the phenomena of Hell Gate, where East river and Long Island sound join, on the eastern side of New York city.

Little exercises of this kind will be found truly entertaining for the teacher at the sea shore. They may be observed also on lake shores, where no true tides are perceptible unless to the most accurate and long continued observations. Indeed nearly all the phenomena here mentioned may be imitated in a tank, in which a continental mass with a specially designed shore line has been constructed of clay or cement, and in which a wooden plunger is raised and lowered in slow rhythm in a little ocean of five or six inches of water. It is my experience that students have not enough opportunity for observational study in connection with the tides, and that perhaps for this reason the phenomena of tides are as a rule so little appreciated and understood.

In this connection reference should be made to a Manual of the Tides by R. A. Harris, which has been published in several parts in the Annual Reports of the Coast and Geodetic Survey for a few years past. The latest number, Part IV B, is in the report for 1904, and consists of a discussion of the "Cotidal Lines of the World." It contains a map of cotidal lines (Fig. 6), which is of particular value in illustrating how completely out of date the cotidal lines as drawn by Whewell now are; not that this need occasion great surprise, for Whewell himself stated, a few years after publishing his original chart, that it was not to be trusted; but that the Whewell chart is still reproduced from time to time in atlases and text-books, where it should not have appeared for fifty years past, except as of historical interest.

Reference may be made also to four plates, illustrating the tides in the Bay of Fundy from photographs by Mr. Roland Hayward of Milton, Mass., published in the February number of the National Geographic Magazine for this year. The second pair of views is the best known to me in illustration of great tidal range.[1] The first view of the pair shows the high piles of a pier, rising 40 or 50 feet above low water; the second picture shows the water nearly up to the top of the piles and a good sized steamboat moored to the wharf. Details concerning the tides of the Bay of Fundy may be found in an article by Chalmers in the Annual Report of the Geological Survey of Canada for 1894 (published in 1895), where it is stated that the greatest authentic range of the Fundy tide is 53 feet, at Noel river in Cobequid bay. Hence the old stories of a 70-foot range should be discounted.

FORESTS AND WATER

An apt illustration of the relation between forests and the conservation of water is shown in a recent letter by Clinton Harris, of Nashville, Tenn., printed in *Recreation*. The letter is as follows:

"To illustrate the relationship between forests and water, make a couple of troughs, line one with clay to represent the country denuded of trees, the opposite trough line with sods of grass or moss to represent the forest-clad mountain side, set them on an incline and connect their upper ends with a rough reservoir. Pour a pail of water into this reservoir and there will be a wild rush of water down the clay-lined trough, while the moss and grass-lined one will drip for hours.

"It only needs a little imagination to convert this machine into a forest-clad mountain and one denuded of timber.

"The cloudburst represented by the contents of the bucket of water suddenly poured into the top reservoir is only a dangerous cloudburst on the barren slope. By the use of this simple device you can explain to a child the absolute necessity of preserving the forests upon the watersheds, if we would have continuous running water and not the certainty of flood and drought which are caused by the watersheds being recklessly denuded of timber."—From *Forestry and Irrigation*.

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[1] In the text accompanying these views, it is wrongly stated that the second pair was taken *at* Wolfville; it should be *near* Wolfville.

AN OUTLINE OF HOME GEOGRAPHY FOR PATERSON, N. J.

BY EDITH S. GARLICK
Paterson, N. J.

I. PASSAIC VALLEY viewed from the hills of Second Mount overlooking Paterson.
  Ridges of hills on either side.
  Slopes.
    Direction of.
    Length.
  River.
    Its winding course.
    Location with reference to slopes.
    Rapids and falls.
  Gap in First Mount showing business section of Paterson.
    Location of city with reference to slopes and river.

II. PATERSON.
  Founding.
    Story of founding.
    Reason for founding.
    The raceway. Value.
    The first factory.
      Kinds of factories.
      Need of people to work in factories.
        Needs of these people and what they led to.
          Homes, good water, stores, churches, schools, etc.
  Growth of Paterson.
    Evidences of growth.
      More factories and more kinds.
        Cotton, locomotives, machine and harness, silk, linen thread, etc., all attracted by the fine water power afforded by river. The machine and harness established to furnish the demands of the cotton, silk and thread factories.
        The population continued to grow because of the employment afforded by the many factories.
      More people.
      More houses.
      Hence more business of all kinds.

- Reasons for growth.
  - Water supply.
  - Nearness to New York markets.
  - Excellent means of communication with other cities.
    - Roads.
    - Railroads.
    - Canal.
  - Nearness to farms and their supplies.
  - Attractiveness of the locality in that it is
    - Healthful,
    - Surrounded by beautiful scenery,
    - Protected from severity of wind and storm by the hills.
- Needs of the people arising with growth of the city.
  - Streets and why needed?
    - For wagons.
    - For people.
    - For drainage.
  - Care of streets.
    - Should be kept in good condition.
      - In repair.
      - Clean.
      - Well lighted.
    - How city provides for this.
      - Taxes collected.
      - Men appointed.
  - Bridges—why?
    - How provided.
    - How cared for.
  - Protection.
    - From fire.
      - Means. Fire department.
      - How furnished and supported.
    - From disease.
      - Means.
        - Laws.
        - Hospitals.
        - Board of Health.
      - How supported and furnished.
    - From crime.
      - Means.

      Laws.
      Officers.
      How furnished and supported.
  Places of worship.
    How furnished and supported? Why?
  Schools.
  Public buildings. Why?
    City Hall.
    Postoffice.
    Court house.
    Jail.
  Institutions for care of
    Poor.
    Sick.

Note—As city grows larger and more thickly settled, the people, more and more, depend upon the farmer for certain supplies which he brings to the city markets. At the same time, the farmer gets from the city stores many things which are necessary to his comfort and livelihood.

Dependence of city upon country for
  Foods.
    Milk,
    Butter,
    Cheese,
    Poultry,
    Eggs,
    Grains,
    Fruits,
    Vegetables,
    Meats.
  Dependence of country upon city for
    Clothing,
    Wagons,
    Farming implements,
    Furniture.
    Many other manufactured articles.

Note—Besides depending upon the country Paterson also depends upon other cities for many articles and they in turn depend upon her.

Interdependence of Paterson and other cities.
  Paterson supplies to other cities
    Silk,

- Machinery,
- Locomotives.

Paterson receives from other cities

- Cotton and woolen cloth and cutlery from New England cities.
- Fruits, sugar, molasses from Southern cities.
- Meats, flour, furniture from the cities of Central States.
- Fruits and wine from the Western cities.

LIFE IN THE TEMPERATE FORESTS

In the Temperate forests and the grass lands associated therewith we find the greatest possible variety of industries, varying according to conditions. The industries of this region are almost entirely those that depend upon the animal life and the tree products. The Polar borders of the timber lands are great hunting grounds, where even now large game exists by the thousands. This area is in the Northern Hemisphere the summer hunting ground of the primitive people of the tundra and of the more advanced people who approach the forests from the south. The more southern regions are more especially used by lumbermen and for fishing. The life of these regions is mostly simple, and the men who go into the woods live a rough, hard, and perhaps lonely life, leaving their families in their homes in the more densely occupied regions. Amid such scenes are developed hardiness, quickness of action, resourcefulness and vigor, and from such training came the frontiersmen and trappers who were so important in this country in the eighteenth and nineteenth centuries. The wealth of the forest must be brought to the edge of the forest before it can be made useful. Within the forest barter is practically the only form of trade. On the outskirts of civilization on the edge of the forest towns spring up, often in our own country around the waterfalls where the timber products are changed into marketable timber or made into wood pulp. The falls and rapids in the stream were always important because here the travelers and explorers had to carry their loads of pelts or other wealth over land. Hence the carrying place or carry was the strategic point in the drainage lines, and the drainage lines are always the lines of least resistance for travelers entering an uncleared forest.

GEOGRAPHY IN THE INTERMEDIATE GRADES*

BY WM. CHANDLER BAGLEY
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1. The intermediate grades are a neglected field in educational theory and practice. Primary work has received a great deal of attention, and the upper grades have always been regarded as important; but the intermediate grades have frequently been the junk-pile for worn-out, inefficient teachers, the training ground for the novices, and the only field absolutely untouched by the rejuvenating spirit of modern methods. And yet the intermediate grades cover the most important formative period of the child's life. During this period, the child has more energy at his disposal in proportion to his weight than at any other time, and he has the greatest power to resist fatigue and disease. This is the time when the teacher can do the most for the child once he understands him; but it is also the time when the child is hardest to understand.

The essential mental characteristics of the child at this stage of his development are (1) his dislike for sustained effort, (2) his slight capacity for 'reasoning,' and (3) his marvelous retentiveness both for verbal forms and for vivid pictures. Authorities agree that the child can accomplish a great deal in this period if he is guided by a strong hand. Here, perhaps, more than anywhere else in school work, the teacher has constantly to battle against nature. The passion for change,—the desire 'to do something else,' —is never so strong. But here, too, these natural and primitive desires can be resisted with least injury to the child. In short, this is the period for serious work with plenty of time for rough and ready play—out of school. This is the time for vivid portrayals, for picture lessons, for school excursions; but it is also the time for drill-lessons, for word memorizing,—the time, in brief, for storing up vivid images and for laying the automatic bases of life.

2. In the geography of the intermediate grades, two important phases of the subject are covered: (1) home geography, which is treated mainly by excursions, by careful observation of the home environment and by simple experiments; and (2) the 'first spiral' of world-geography, which is treated by maps, pictures, oral descriptions and books. The latter phase has to do particularly with the use of the smaller or introductory text-book. Our especial problem will be to review briefly the principles that underlie the suc-

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* Reprinted from Normal College Bulletin, August, 1904.

cessful use of this text-book and the use of maps, pictures, models, and other supplementary material in connection with it.

3. The *function* of geography in the intermediate grades is primarily to fix facts and to give the child vivid pictures of various parts of the earth's surface. 'Reasoning work,' by which we mean the pointing out of causal relations, is not much in place at this time. Such work is rather the function of the grammar school geography. Here, however, it is not as much *why* as *what;* not so much the reason as the fact. For example, in the intermediate grades, the fact that New York is the largest city in the United States should be firmly impressed; in the upper grades the pupil should discover the reason for the growth of this city.

A great deal of the place and location-geography, now somewhat in disfavor, may profitably be re-introduced into the intermediate grades. A solid foundation of fact is essential to the later reasoning work, and the intermediate grades are the place where facts may be most easily and economically impressed. Memoriter work may become a legitimate and important factor here *after the facts have been vividly portrayed and richly illustrated.* The evil of the older memoriter methods lay in the fact that dependence was placed exclusively on repetition and rote-learning. The evil of the ultra-modern methods lies in the fact that vivid portrayal and detailed illustration are believed to be sufficient and any form of memoriter work a waste of time. Careful experiments have recently demonstrated, however, that verbal repetition greatly increases the 'revival value' of facts that have either been vividly impressed or 'reasoned out.' A compromise between the two extremes is probably the best guide for practice.

4. The *text-book* used in the first spiral should be selected with reference to the function of the course. In general a good text-book for this stage of the work should fulfil the following conditions:

(a) In style it should be descriptive rather than explanatory or expository. For this reason it should *not* be a mere abridgement of the larger geography, as so many of the elementary text-books are. The treatment should be entirely different. The larger book is necessarily concerned with causal relations and a mere compression makes the treatment formal and lifeless. The most important characteristics of a good introductory work are detail and wealth of descriptive illustration.

(b) On the other hand, the text should be systematic and comprehensive; that is, it should treat the various subjects in a definite and fairly complete manner. This is why even the best of the supplementary readers, such as Carpenter's and Johonnot's, are not suitable for texts. They are rich in description, but they lack system. Their function is to supplement the text, not to replace it.

(c) The text should emphasize particularly the *people* of different countries,—how they live, how they dress, how they amuse themselves, how they work,—rather than industrial and commercial features of a more abstract nature. The child-life of various countries, as well as the plant and animal life, should receive special attention. Even a partial restitution of the old 'curiosity-geography' of Peter Parley and other early writers might not work an evil. This is the wonder-age of childhood and vividness of portrayal may even border on the spectacular without doing a great deal of harm.

(d) Finally and fundamentally, the elementary text-books should be replete with pictorial illustrations which should be used explicitly for purposes of instruction and not merely as means of diversion and amusement.

5. The *use* of the text-book during this period involves one very important difficulty. The elementary geography is the first book that the pupil uses purely and simply as a text. Therefore the teacher has not only to teach geography but also to teach the child how to study,—how to gain experiences through the medium of the printed page. The trouble which the child finds in 'studying' his geography lesson is precisely similar to the trouble which the adult finds in reading a book upon some subject with which he is unfamiliar. It is not sufficient that the child 'know how to read.' He may be able to do this satisfactorily and yet be unable to grasp the thought that the book presents.

This difficulty of 'preparing' the lesson leads in many cases to the use of the smaller geography as a reading-book. The lesson is read in class rather than 'recited,' and this process is sometimes continued throughout the fourth grade. In the writer's opinion, this is bad practice. The geography may contain 'reading-lessons' which may properly be treated in this way, but, in general, the text is designed as a text and as such it is to be prepared and recited upon.

6. It is in the *study-lesson,* then, that there is greatest need for the oversight and direction of the teacher. The statement made by President Hall regarding history is equally applicable to the study of geography: "At least three-fourths of the time spent by a boy of twelve in trying to learn a hard lesson out of a book is time thrown away. Perhaps one-fourth of the time is devoted to more or less desperate and conscientious effort; but the large remaining portion is dwindled away in thinking of the last game of ball and longing for the next game of tag." The problem of the teacher is to overcome this difficulty and eliminate this waste.

To this end several devices are available. In a great many schools, the main facts of world-geography are developed orally before the child takes up the text-book? This is the policy in the Butte schools; (see ***Report of Public Schools,*** Butte, Mont., 1903-04, pp. 153-154.) The oral work in world-geography follows the oral work in home geography and precedes the book. The advantage of this plan is that the first part of the book work covers a field with which the children are already familiar.

Another plan is to take up the book immediately after finishing the home geography, using the oral methods, however, to introduce each lesson. That is, the material of the lesson is worked over in class before the book is touched, then the same lesson is studied by the pupils at their seats, and finally a recitation is made upon the text. In this way, the pupil becomes familiar with the thought and hence is enabled to read the text intelligently. In this way, too, certain points of interest may be raised concerning the subject-matter which the pupil may be anxious to amplify from a study of the text. Thus he will have a motive for that application without which the study-lesson is likely to be a mere mumbling of words.

7. Either of these methods may be employed to facilitate the pupil's introduction to the art of study. In either case, however, the introductory oral work must sooner or later give place to a more independent use of the text by the pupil. In what manner shall this later phase of the work be treated in order to involve as little waste of time as possible?

Let us examine, in the first place, the difficulties that confront the teacher at this point. Assuming that the pupil knows something of the subject-matter (and it is idle folly to set a child at a book-lesson if this is not the case,) it is still true that he will frequently, even under the most favorable conditions, find it difficult to hold his mind closely to the reading. Attention is a rhythmic process. Whatever appeals to the attention must correspond in some measure to the 'rise, poise, fall' of the attention-wave. In oral instruction, this condition is easily fulfilled. By modulation of the voice, by facial expression, by gestures, we may emphasize the salient points and minimize those that are less important. The material of the text-book, however, —even at its best,—is more or less upon the same 'level.' It is an aggregate rather than an organized unity. Its perusal, therefore, becomes monotonous, and attention avoids monotony as nature avoids a vacuum. How, then, may the salient features of the text be so emphasized as to relieve this monotony and introduce a useful variety?

(a) It is customary among the best teachers to bestow not a little care upon the assignment of a book-lesson, and in the course of this assignment to point out very explicitly the features that the lesson is intended to emphasize.

This is an excellent practice and one that cannot be too faithfully cultivated; but even a skillful assignment is hardly enough to insure maximal success. Some method must be employed to keep the pupil's mind constantly returning to these salient points.

To this end, questions written upon the blackboard and covering the essential features of the lesson are extremely useful. These questions should be based upon the text and so framed as to admit of answer only after a study of a certain portion of the text. Such questions may then be used in the recitation, although they should, of course, be supplemented by others of a more detailed nature.

(b) As the pupil becomes more and more familiar with technical terms and fundamental conceptions, the questions may be replaced by *topical outlines* covering the matter of the text, and these in turn may form the basis of a topical recitation. These should be a gradual outgrowth of the questions and made very full and detailed at the start, gradually becoming more and more schematic as the pupil becomes practised in their use. Some of the smaller geographies have such outlines appended to each chapter. That the pupils seldom use them is due to the fact that they have never been trained in such use.

(c) A third device may be profitably employed in connection with those just mentioned. The pupils may be encouraged to make occasional lists of questions for themselves, covering the material of the text. The pupil submitting the best list may then be permitted to 'quiz' the class,—to turn teacher for the time being. This gives the child a motive for reading the text carefully and searching out its important points. Indeed, it is so successful a device that teachers who employ it are often tempted to carry it too far. The pupils come to look, not for the important points, but for obscure details which may be overlooked by their fellows. Like all devices that call into function the powerful instinct of emulation, it must be handled judiciously if it is not to defeat its own purpose.

(d) Growing out of this device is a fourth and final,—leading the pupil to make for himself an outline of the text assigned. This is an art to the cultivation of which we pay altogether too little attention in our present-day methods. If the child acquires what might be termed the 'outing habit' early in life, he will, in course of time, acquire the ability to make a serviceable outline without resorting to pencil or paper,—holding his attention over a long series of topics without undue exertion. He will no longer read, as many of us do, even in adult life, following the words faithfully with the eye, while the wits go wool-gathering. Such a mastery of the art of study involves, of course, a great deal of hard work on the part of both teacher and pupil. Moreover the road has to be traversed anew for every subject that is taken up; for we cannot think of a 'generalized habit' of study any more than we can think of a generalized habit of cleanliness or industry. All habits are specific; but we can have ideas and ideals as to the best methods of study, and these will be only strengthened by persistent practice in various fields.

8. The elementary text-book should be the central feature of the first spiral in geography, but the work should by no means be limited to the text. The *supplementary readers* which are now available in great abundance should form an integral part of the course, and the fourth and fifth grades should be supplied with at least two sets of these readers.

Whatever supplementary reader is used, great care should be taken to correlate the material with the text. If the class is studying South America, for example, it would be absurd to use Carpenter's *Asia* for supplementary purposes. A definite period should be assigned for the supplementary reading. This should be taken preferably from the time allotted to reading as such rather than from the time allotted to geography. If five periods a week are devoted to reading, two of these may well be given to the geographical supplements.

9. Aside from the geographical supplements used in the class-room, the *home reading* of the pupils may profitably be correlated with the work in geography. There are a number of excellent books of travel and exploration that are written in a style adapted to children. In districts that do not enjoy the advantages of a public library, some of these should find a place in the school library. The series written by Knox and by Scudder, although belonging to the last generation, are still acceptable. Even Jacob Abbott's books of travel for children, belonging to a still more remote period, have a certain charm that will insure their survival. Of modern books, there is a wealth of good material to choose from. One in particular may be recommended,—Frank T. Bullen's *Cruise of the Cachalot,*—a book that should have a place in every school library. In general, books of travel that are written in the narrative or 'story' form will appeal more strongly to children of this age than those that are merely descriptive.

10. The use of *pictures* to supplement verbal instruction is of paramount importance in the first spiral. The child is still in the period of concrete thought. He is, it is true, slowly emerging into the conceptual stage, but the concrete is still uppermost and should be appealed to constantly in the work of the school. As already indicated, the pictures that appear in the text-books should be used explicitly for purposes of instruction and not as means of diversion or amusement. For example, in studying the southern

states, the pupil may chance upon a cut representing the levee at New Orleans. This picture typifies the commercial life of this important port, and if the teacher and his pupils were upon the levee actually watching this scene, the situation would undoubtedly be turned to educative account. The children would inquire about the great bales of cotton,—where they came from, where they were going, what was to be done with them. They would note the contrast between the river steamboats and the ocean steamers and ask why the former were so different from the latter in shape and size and means of propulsion. They would be curious to know why the bales were packed on the decks of the steamboats instead of being stored away in the holds as in the case of the steamers. The teacher would then explain the difference between ocean and river navigation,—the need for small, light-draught craft for the former and the need for large, deep, well-protected hulls for the latter,—the difference between paddle-wheels and screw-propellers, and why the latter are suitable for the steamer but unsuitable for the steamboat. The necessity for trans-shipment, which is the keynote of the growth of trade centers, would then be far clearer to the pupils than a week of formal instruction could make it. Now the picture that represents this scene may be used in precisely the same manner. It lacks, it is true, the life, the movement, the never-ceasing change and diversity of the real situation, but these may be compensated in some measure by the interest and enthusiasm that the teacher can put into the picture-lesson.

In some of the larger cities, the *lantern-lesson* has become an integral part of the geographical instruction. Each school has a small stereopticon (a serviceable lantern may be purchased for fifty dollars) and several sets of slides representing all phases of geographical work are kept at a central office. These are catalogued with a full description of each slide. If the teacher in the fourth or fifth grade wishes to give a lantern-lesson he consults the catalogue to find the slides that are available and the subjects treated by each. These are then distributed among the members of the class, each member being given one or more topics to work up. The pupils find from their geographies, their supplementary readers, their reference books all the information possible concerning the several topics. Each pupil then puts his material in brief form and on the day of the lantern-lesson, he 'lectures' to his fellow-pupils for two or three minutes upon the picture which has fallen to his lot for description. In this way, the pupils have a very powerful motive for gathering information and putting it in good shape. Needless to say, a lantern-lesson that does not involve this activity of the pupils is of slight value as an educative agency, however entertaining it may be. Pictures, like travel, avail but little if only the passive attention is appealed to.

While the lantern-lesson is probably out of the question for the majority of schools, the principle that conditions its success may be applied to the treatment of other than lantern pictures. Every fourth and fifth grade room should have a number of portfolios of pictures illustrating various phases of geographical instruction. In this day of cheap magazines, such illustrations can be collected without cost. They should be mounted on large cards of uniform size, appropriately labeled and filed away. They may then be employed as in the lantern-lesson, by having each pupil work up a picture for explanation on the day assigned for the lesson. It is hardly necessary to say that the force of the picture or lantern-lesson would be greatly diminished by too frequent application. One of the strong points of the device is its novelty, and this can be preserved only by temperate use.

11. We have said that the period covered by the intermediate grades is the most favorable time for impressing vivid pictures. This means, among other things, that the *map study* of the first spiral is extremely important. This is the time to give the pupil accurate map-pictures. He should be able to visualize maps,—to see the details and form-relations in his 'mind's eye.' In a former paper on home geography, some suggestions were given for making map-study meaningful to the child. The general procedure there laid down may be profitably continued throughout the intermediate grades. The map is a *symbol,* and the intelligent use of symbols always depends upon *a gradual process of condensation and abstraction from the objects symbolized.* If this process has not been carried out faithfully, the use of symbols becomes mere formalism. This danger is to be combatted most strenuously in the teaching of arithmetic, but it is not to be overlooked in geography. The map may easily become simply a complex of colored spaces, interlaced with lines and sprinkled with dots and letters. The pupil may acquire the art of juggling very successfully with maps, just as he may juggle with figures, without having the slightest conception of their meaning.

If the pupil has passed faithfully through the initial stages of map-study, however,—modeling land-features found in his immediate environment, reducing these by scale to map-form, modeling land-features from maps of regions that he has not seen, etc.,—he is quite ready for an intelligent and intensive study of maps in connection with world-geography. The first study of any geographical unit should be a map-study. Everything that can be gained from the map should be noted before the text is consulted. The latitude and longitude of the region, the surface, the drainage, the coast-line features, the relations to other bodies of land and water, should be worked out by the pupils from the map and impressed as facts. The deduction from these physiographical data should not be unduly pressed at this time. That is to say, the method of inference which is applied so profitably in the upper grades is not now in place. The writer has attempted to employ in the fifth grade the same methods that are employed with great success in the seventh grade and he has found, almost without exception, that the pupils fail to respond with any degree of enthusiasm. They may perhaps make such simple inferences as climate from latitude, commercial advantages from coast line and surface, etc., but the accurate inferences involving the more difficult principles of prevailing winds, moisture, ocean-currents, and the like, should be left for later development. In short this is the time for facts rather than principles, and the purpose of map-study in these grades should be to furnish the child with a definite and accurate picture of the various regions studied.

To this end, the memorizing of boundaries may be helpful if prosecuted temperately; also the memorizing of 'capitals and largest cities' and their locations, the rivers belonging to certain continental slopes and water-sheds, the chief capes, peninsulas and head lands, and particularly the names of states and countries in some definite and uniform order. This may seem decidedly reactionary to those who have come to believe that memoriter work is useless drudgery and entirely out of place in the school. But, as we have already pointed out, experiment has proved that verbal repetition will help materially in the retention and recall of experiences that have been fixed either by vivid portrayal or by processes of reasoning; and it is the writer's experience that the unsatisfactory results that we meet in the grammar school geography must be laid at the door of loose methods and especially of inadequate memory-drills in the intermediate grades.

12. *Map-drawing* is necessarily an important phase of this part of the course. The test of an adequate mental picture of the map is the ability to sketch the map quickly and accurately. Many teachers make a practice of sending a few pupils to the blackboard at the beginning of every geography lesson to sketch in a brief period,—say one or two minutes,—the main features of whatever region may be under discussion. Retention and recall are both improved by expression and the more numerous the channels of expression, the greater the advantage from the standpoint of memory. The results will be extremely crude at first but with practice under careful criticism, they will show a rapid improvement and at the end of three or four months of persistent, painstaking work, it is remarkable what the pupils can do in the way of map-sketching. One or two introductory lessons may perhaps be given in the copying of maps from the book, but this

should be reduced to a minimum; it is the free-hand sketching from memory that is the most beneficial. The finer work will come later in the upper grades, where the principles of projection should be carefully developed and maps constructed in a nice degree of accuracy.

The making of *progressive maps* is also in place in the intermediate grades. The outlines should be preferably drawn by the pupils themselves, although there is no great harm in using the lithographed outlines occasionally. The use of outline wall-maps is likewise to be commended. A good set of relief maps and a relief globe are almost indispensable to the development of adequate ideas of surface features. The objection that has been raised against relief maps and globes on the ground of the exaggerated scales that they employ is not, in the writer's opinion, valid from the educational standpoint. While a relief map of Asia may exaggerate the height of the Himalaya Mountains from the standpoint of absolute truth, the height cannot be exaggerated if we consider these mountains as impediments to human intercourse. They are effectual barriers between two different regions and, as such, their absolute height might be multiplied ninety or nine hundred times without doing violence to one's conception of them as barriers; and this, we take it, is the proper geographical conception.

SOME RESULTS OF GEOGRAPHY TEACHING

Of all elementary studies geography best affords opportunity for training pupils to *right habits of studying books.* During three school years the pupil "learns to read"; in the fourth grade he uses a text-book in geography and "reads to learn" about the world. He should be taught and accustomed to the systematic study of pictures, maps, and text, with a view to the ready and orderly expression of the knowledge gained. Through such a strenuous course the teacher must yet aim to conduct the work so that the pupil shall leave the elementary school with a *desire to continue* the study of the world and its peoples. Pupils should become accustomed to use the public library wisely to this end. Ably directed and enthusiastic study of the geography of our city, of the United States, and of the world may secure the highest ends, the development of broad *patriotism*—active love for our city, for the nation, for humanity.—From *Course of Study in Geography,* Lynn, Mass.

EDITORIALS

FIELD EXCURSIONS IN SCHOOL GEOGRAPHY

THE opening of the school year is an opportune time for again emphasizing the advisability and possibility of incorporating excursions in elementary school geography work. Excursions to study industries in operation can in many localities be conducted at any season but excursions to study field phenomena or such industries as are carried on out of doors are necessarily restricted in time to the open season in autumn and spring.

No argument is necessary to show that excursions are absolutely necessary in association with the class room study of the surface features of the earth—no matter in what school year these features are taken up. The mere word and picture study of the forms of land and water is better than nothing but children can only secure valuable results of permanent worth when their study is based largely on the personal observation of facts. Inexperienced children cannot read aright the pictures of phenomena they have never seen, and imaginative children are liable to get grossly exaggerated erroneous conceptions from unreal geography.

Excursions may be for two objects,—as one teacher has well expressed it, many excursions with mature pupils should be for field work—that is, for the purpose of studying first hand subjects that are new, and which are presented first in actuality.

Other excursions may be for "field sight,"—that is, for the purpose of illustrating subjects and relationships already taken up in the class room. The method of conducting excursions naturally depends upon the object for which they are planned and varies with different localities and topics of study.

No one should be prevented from conducting excursions because of inexperience in this work, for the difficulties are not so great as is usually anticipated. Of course the teacher should know the ground thoroughly, should know how it can be reached and should have the mechanical side of the excursion thoroughly planned beforehand so that it will move like a series of army maneuvres.

The chief difficulty to be encountered is due to the fact that the public is not accustomed to seeing children at work out of doors. Hence the usual gathering of "camp followers" who make comments and distract the attention of the pupils. In Switzerland and some other countries of Europe excursions of school children are so familiar to the public that no one pays any attention to a group of children at work out of doors. Excursions are approved by the authorities and by the parents and are welcomed by pupils and adults.

By keeping continually at it the public will soon approve school excursions in this country. Hence the advantage of carrying on excursions systematically.

No locality is too poor in geographical phenomena to be exempt from excursions and no teacher of geography should hesitate to take advantages of the opportunities of her vicinity. The autumn is a splendid season to begin excursion work and the more excursions the better, provided they are systematically planned and distinct contributions to school work. No excursion should be merely a picnic, and yet class room discipline should not be maintained when the class is on the move between one locality and another. Neither should inattention be allowed when the class is facing the object of the excursion. A rational combination of freedom and class discipline will make the excursion a success and at the same time a sufficient change from class room work to be enjoyed by all engaged in it.

GEOGRAPHY IN THE INTERMEDIATE GRADES

Attention is particularly called to the article in this number on Geography in the Intermediate Grades. As the author accurately states, no phase of school geography teaching is so poor as that in the Intermediate Grades. The work for beginners has been revolutionized and vastly improved within the last few years. Geography in the upper grades has been on a higher and better plane for a decade, but the intermediate work is still, as a rule, much the same as it was twenty years ago. How to teach geography as well as children, how to give training in studying the subject, as well as an elementary knowledge of the subject, without merely doing in an abridged way what is to be done more thoroughly in the later grades, is a serious problem.

Courses of study are particularly weak in this phase of the work, and no "method" has been devised that solves the problem. Indeed, it is not a new method that is wanted but a better ability on the part of teachers to organize human geography and lead the pupil from the home to the world without any violent break in the ways of presenting the materials.

REVIEWS*

THE four volumes of the Philippine census bring together for the first time "complete returns of the population and resources of the archipelago." They therefore form the first source of reference for general and special information in reference to the Philippines.

The first volume is devoted to the geography, history and population of the Philippines and includes an excellent summary account of the physical formation, climate, volcanoes and earthquakes, elevations, islands, discovery and progress, the judiciary, history of the population, characteristics of the civilized or Christian tribes, and of the non-civilized tribes. Illustrations and maps are numerous and valuable. The chapters dealing with the different tribes give an excellent account of the physical, social and mental characteristics of the peoples and their method of life. This volume is the most generally useful of the series.

The volumes on population and mortality, defective classes, education, families and dwellings are almost wholly statistical, after the general plan of similar reports in reference to the United States. Volume Four deals with agriculture, social and industrial statistics, and contains a mass of detailed statistics. The earlier part of the volume contains a detailed account of the products, their distribution, cultivation and harvesting. The volume is well illustrated with pictures showing the processes of the varied industries and is very effective. This volume and Volume One are the most generally useful to the lay reader, while Volumes Two and Three will be of service mainly to the special student of selected problems. R. E. D.

The second edition of Gannett's Origin of Certain Place Names in the United States is an extremely interesting Bulletin of great help in giving vitality to certain phases of local geography. The relation between local names and history is clearly indicated, as the following example will indicate:—Vineyard Haven; town in Dukes County, Massachusetts, so named because of the quantity of vines found on the island at the time of discovery. Haven from the harbor or haven on which the village is situated.

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*Census of the Philippine Islands, 1903, in Four Volumes. United States Bureau of the Census, Washington, 1905.

*The Origin of Certain Place Names in the United States, by Henry Gannett. Bulletin 258. U. S. Geological Survey.

NOTES

Organization in School Geography.—"When I was fourteen or fifteen he taught me to place my knowledge as it came, to have its proportion. He so kept me to the drawing of maps that the earth has ever since lain beneath me, as if I could see it all from a great height, and so taught me history that I see it now as a panorama, from the first days. In his time I could draw the coasts of all the world in very fair proportion, without looking at a map, and I think I could do it now, though not so well as then perhaps."

The above quotation from a letter written by Burne-Jones forty-five years after the occurrence of the school experiences he describes is suggestive to those who are interested in geography teaching. There is no subject which requires more definite planning for there is such a range of detail which presses upon the attention and which, from the standpoint of interest, justifies consideration. But here as elsewhere a careful plan is required, not, for the sake of the plan, but from the fact that only if the central scheme is well in mind can the teacher feel free to reach out into the inviting fields which present themselves.

I have often wished that some one would formulate that part of geography which has survived in the consciousness of men of fair range of activities. I would by no means advocate cramming children with a skeleton of this material but a good teacher, with this in mind, could plan so that the substance of that which will prove useful would be used for several years in succession and thus it would come under the pupil's control. During these years he could roam through any amount of the material in our excellent modern geographies, books of travel, guide.books, railroad folders, etc., but a certain scheme of outline maps, surface maps, product maps,—whatever proves worth while, would give him a center to which this large range would have constant reference.

I visited a third grade in a neighboring city recently and found that the teacher had hurried through the course of study in geography early in the year and had then set out to help the children to formulate such a geography as suited their needs. Rather against her wishes I sent the children to the board. "They haven't been drilled or tested on any of this work," she told me. But I insisted and I found that what they had brought together they had used and they had it under control. Whether I took up their own state, the United States, any continent, or a hemisphere, it meant something definite and, best of all, it meant in each case a few things well understood. I told her when I left the room that the strongest part of her work was shown in her judgment in knowing what to leave out. I do not wish to have children of that age, in schools in which there is an opportunity for more industrial handwork, do as much as those pupils had done in geography, but in that school it was the most concrete part of the curriculum and was well used.

Geography is pressed hard by nature study on one side and history on the other and its relations to all the other branches (we might almost call them twigs for their number) of study are evident. All the more reason that we take care to respect the personality of the subject and make it more than a handmaid to the rest of the curriculum. Some day we shall see this clearly enough to give it, apart from the occasional term assigned to geology, physiography, commercial geography, a place in the secondary school curriculum second to no other subject in importance. The increasing respect it is receiving in the colleges will help to bring this about.—F. A. Manny, Ethical Culture School, New York City.

A Method of Conducting Field Trips.—Teachers often find that field trips do not accomplish as much as is expected, and they are led to ask: "Considering the amount of extra work involved and the strain upon the teacher, do field trips pay?" This, of course, depends upon how much the pupils get out of the trips. After trying several plans, I have settled down upon this one: (1) Select a rather limited territory to be covered. (2) Select a definite topic to be studied. (3) Hold the class to this topic and study it in detail. (4) Prepare a list of questions which shall direct the pupils in their observation and have a copy of the questions in the hands of each pupil.

Following is such a list of questions prepared for use in the Trenton, N. J. schools. They are designed for sixth, seventh, or eighth grade classes. Four thousand copies were printed and distributed among the schools.

Two or three trips of an hour each, or one longer trip, are necessary to do the work covered by this set of questions.

Field Excursion in Geography.—Place—Cadwalader Park, North Side. Topic: The Work of Streams.—1. Study the stream from the lake to the culvert under the canal, watching for examples of (a) erosion, (b) transportation, (c) deposition.

2. Discover places where the stream is aggrading its bed; degrading it. Decide whether or not the stream has yet reduced its course to grade. Reasons.

3. Find various evidences that the stream is doing work. What are some of the evidences?

4. Sometimes the stream does more work than it is now doing. When? Why?

5. Why are there large stones in some parts of the stream-bed and fine mud in others, and only bare rock in others?

6. Find examples of the following: (a) flood plain, (b) rapids, (c) falls, (d) young valley, or gorge, (e) mature valley (broad, with gently sloping sides), (f) lakes.

7. Why does the valley get wider as it gets older? How do we know that a gorge is a young valley?

8. What causes the lake in this stream? Aside from the lake caused by the dam, is there any other lake in the stream-course? Cause? Why is it likely to disappear?

9. How might a lake of considerable size be formed in this valley? How might several small lakes be formed? Mention two ways by which lakes are caused to disappear.

10. Why does the stream flow more swiftly in some parts than in others? Is it doing more work in such places? Explain.

11. Explain in detail how a stream deepens its bed; widens it; forms flood plains; grades its course.

12. What causes the water-falls? Are they of the "step falls" or of the cataract type? Why will they change slowly from year to year? Why will they "move up stream?" Do all falls tend to move up stream? Explain. How about Niagara?

13. Does this stream appear to be carrying much waste, or sediment? May it sometimes carry more than it does now? Explain.

14. What caused the valley in which the stream flows? Is the valley becoming deeper? Wider? Explain. What becomes of the waste washed away by this stream? Are other streams doing the same?

15. Whence comes the water which supplies this stream? Why does it flow even long after a rain? Why does water flow down hill?

16. What do we mean by "water power?" Are there any places on this stream where water power might be utilized? Explain.

17. Imagine this brook to be increased in length, width and volume until it became as large as the Delaware, yet retaining exactly the same features (enlarged) that it now has. Considering the mouth of the river to be at a place where the teacher will indicate. Then, (a) where is the navigable portion of the river? (b) The head of navigation? (c) The fall line? (d) At what place do you think the chief city of the valley would spring up? (e) The second largest city? (f) smaller manufacturing towns? (g) Summer resorts? (h) Where would bridges probably be built?

Give reasons for each answer.

18. Basing your conclusions upon what you have observed in connection with this stream and others, formulate five or six *general principles of stream action,* such, for example, as:

1. Streams erode where they flow swiftly and deposit where they flow slowly.

2. Streams transport sediment from the higher lands to or toward the sea.

R. H. W.

CONCERNING GEOGRAPHY TEACHING.—Granting that geography shall in a general way be a study of the earth as the home of man, and thus be made to include somewhat of history, of government, of religion, of trade and commerce and industries, of the fauna and flora of the several political divisions of earth as studied, it likewise holds true here as in all matter selected for school instruction—some parts are educationally of greater importance than others; some ways of presenting the same subject-matter to pupils are far more productive than others of good results in mental growth and ability. Supplementary reading concerning distant places and nations, the narratives of travel and of exploration have their important place with geography teaching; but it is ever to be remembered that this place is strictly secondary, designed largely to extend the range and to make application of the class instruction as time and facilities at hand shall permit.

Geography as a life-long study may well leave to later years much information now crowded upon the inexperience and the indifference of the grammar school age, while the fuller comprehension of our portion of the earth as our home—its phenomena of air and water and soil—is under no plea or excuse to be neglected or omitted. In geography as commonly taught the facts of environment have very largely been relegated to a term of so-called Physical Geography, and left for the ninth grade in the high school or omitted entirely from the curriculum, and this, notwithstanding such facts and phenomena used day by day and grade by grade stand unrivalled as means to stimulate thought, provoke inquiry and lead to a mastery of the surroundings of life.

LABORATORY WORK IN GEOGRAPHY.—In urging that the teaching of geography be so modified that it becomes indeed an integral part of a continuous line of science work, even as arithmetic is for mathematics, or grammar and composition is for the English work, the vital point is after all not so much one of subject-matter to be presented as it is a question of how the facts constituting the usual stock of geographical knowledge shall be acquired—the manner of their use in training to mental development. It is not of supreme importance that the texts in geography contain matter that were better assigned as supplementary reading or omitted altogether; nor is it the case that the facts and phenomena of the environment of the children generally are not set forth in the texts in geography in common use in the schools to-day. And it may be said right here that some of these modern texts are in most respects marvels of progress in teaching, and in the hands of teachers trained in the ways and spirit of modern methods leave little to be desired. Nevertheless, in all these books geography is made subjective, and it is the book that is studied rather than the forms and phenomena of earth. The geography text of to-day is a most fascinating story, with its superb maps and illustrations, as it tells of man's home and man's doings. Reading into it the broader experiences of the more mature mind, it seems to have attained the acme of perfection; but, withal, its subjective treatment of the topics of geography, as commonly taught in the schools, puts the geography too largely upon the same basis as the supplementary geographical readers, the narratives of travel and of exploration, and, divorced as it is from the concrete forms of nature, there is in it to the child mind altogether too much of the element of the "Once upon a time" story.

The mere facts of earth study, even if the pupils were to become in the years of their school life veritable encyclopedias of geographical knowledge, are relatively of far less importance than the training that comes from the objective study of the same topics—a training that does not stop with an intelligent comprehension of nature's ways and of man's adaptation thereto, but enables the pupil as well to put to all his relations of later life the same rigid requirements in getting at the truth of things, and the same reasoning processes as required in his laboratory science whereby conclusions are based upon facts rather than "jumped at."

NO TIME FOR LABORATORY WORK.—The plea for laboratory work in connection with geography teaching affirms (1) that it is better that the children be required to note with care and to make study first hand of the forms and phenomena of earth rather than to read only about them in books; (2) that it is better to know more of the causes of the natural phenomena about them and less of distant lands and peoples; (3) that it is better to master enough of the particulars of environment whence to reason to general conditions prevailing around home and elsewhere than to begin with general statements, and that pictures and various forms of illustration shall be used to lead up to the general concept rather than for deductive study; (4) that to be spared the time and effort required in a mastery inductively while in school of the common facts of the natural environment is to be short that much in a preparation for later life where every person must repeatedly and in all manner of affairs reason inductively to conclusions based upon the facts in possession, by which conclusions the course of life is ordered; (5) that so far as the geography is part of a course in science this simple concrete nature work makes possible as no other means can the amount and character of science work properly expected to be done in the high school.

THE HUMAN ELEMENT IN GEOGRAPHY.—That no misunderstanding arise in thus urging at length the science phase of the teaching of geography, both from what has already been said and from the type lessons to follow, there is need at this point to note that the study of geography is unlike the science studies of the high school in the strikingly important feature that every fact and every relation is viewed and its relative importance determined by reference to man's existence, his interests and activities. From the individual as a center with an ever widening range of inquiry and mastery, the studies in geography reach out in all directions and into all fields of human interest and of human effort, including not only the beginnings of the various sciences but as well history, government, sociology, together with much of trade and commerce and the different industries in which man engages and which contribute to his happiness, his comfort and his progress in civilization. Indeed, attention may well be called to the fact that not only does geography give to history its place realities and, through its surface and climatic conditions, play a leading part in the history of the race, but in the very training herein advocated through the study of natural features and conditions brings to the advanced history study the ability to see the relations of facts historical, and to reach conclusions for one's self based upon such facts, demanding of the historian of the past as of the writer of current history that he give the facts in full, allowing the reader to come to opinions of his own.

It may be added further that so fully have these relations been recognized and met in the modern geography text with its admirable lines of supplementary reading that it is in the science phases almost exclusively that there has been lack of progress commensurate with their importance, and that progress in these other phases has not always been free from encroachment upon the time allotment for elementary science.

SOME TYPE LESSONS IN GEOGRAPHY.—These type lessons in laboratory work in geography, together with the lists of books and of supplies, were prepared as part of a report on modifications in geography teaching made to the Physical Science Section of the State Teachers' Association at its meeting in Omaha, December 28-30, 1904. Their purpose and place in the teaching of geography can be set forth in the following general statements:

(1) The work in geography is planned to extend into or through the ninth grade.

(2) The teacher and pupil shall spend much time and much stress is to be laid upon the forms and phenomena of earth and air and water—the common environment of all, and these shall be dealt with objectively from the outset rather than by reading about them. The intent is that from the beginning there is sought an intelligent comprehension of local conditions, including those phases of elementary physical science therein presented.

(3) In connection with and supplementing such work at its earlier stages there shall be used a beginner's book on Home Geography. Such book should be one whose wisely chosen pictures serve for studies as well as for illustration, setting forth clearly the conditions discussed as the same may be observed in the locality pictured. The connected narrative serves as a backbone to which to articulate all experimental and field work, preventing it from becoming disjointed and fragmentary, serving as well to enable the pupil to pass from an understanding of things of the immediate neighborhood to other regions presenting like phenomena and type forms.

(4) A distinction is to be made between Home Geography as a text in the hands of the pupils, and any supplementary and reference books for the geography work with which the school library shall be supplied. A selected few of such books are named in connection with these lessons.

(5) The experimental work not only enriches the geography teaching by making the earth studies very real, partaking in some large degree of the life experiences of those taught, but the pupils are at the same time being trained through the geography work into all the advantages of a connected continuous course in elementary science. Herein lies a practical solution of the vexed problem of nature study for the graded and rural schools.

(6) Further, it solves the all important problem of how there shall be provided for the pupils who never reach the high school some considerable of the facts of elementary science and of the training gained therewith, making possible as well in the high school the science work demanded there.

(7) A laboratory course carried into the ninth grade makes possible under guidance the study and interpretation of forms shown on topographic and relief maps, obtained for and kept as part of the supplies for teaching geography.—From *Nebraska State Normal School Bulletin,* April, 1905.

SALT HARVESTING ON GREAT SALT LAKE.—In some respects the salt industry of Utah is of peculiar interest and picturesqueness, and a trip out to the salt-works at Saltair would well repay any visitor to Salt Lake City.

For the first few years the salt was obtained from the evaporation, during the summer, of the water contained in little lagoons or natural basins along the shore of the lake. The early settlers were supplied in this crude way until about 1860, when some one conceived the idea of building earthen dams in low places along the shore of the lake, which would hold back large quantities of water for evaporation.

If the lake water were evaporated just as it is pumped in, a number of undesirable impurities would be precipitated along with the salt. To avoid this, the water is passed through a series of ponds. The first of these is a large "stock" or "settling" pond, around which are grouped a series of shallow "harvesting" ponds, each about eight hundred feet wide and one thousand feet long. About May 1 the stock pond is pumped full of water from the lake, and this is allowed to stand until the iron and most other impurities have settled to the bottom as a reddish precipitate. The water is then permitted to flow into the harvesting ponds, which are usually kept about six inches deep in brine. In an ordinary hot season the water will evaporate at the rate of about two inches a day, and this loss is made up from the stock pond, which in turn is kept full by pumping direct from the lake. A further purification is effected by the fact that one of the principal impurities contained in the brine, sodium sulphate, floats when formed, and is driven to the leeward sides of the ponds. The product from these parts is therefore impure, and is marketed for cattle and silvermill use, while that from the rest of the ponds is very pure salt and is sent to the mill for further refining.

Until about September 1 the ponds are kept full of water, after which time pumping stops and the ponds are allowed to evaporate almost to dryness. They are not permitted to evaporate completely, for the last inch or so of brine contains impurities, and is therefore drained back into the lake. During the progress of this evaporation, the brine has deposited a layer of salt on the tanks. In average seasons this layer is about three inches thick, though as much as six inches has been obtained in particularly favorable (*i. e.,* hot) years.

After evaporation has emptied the ponds, the salt is ready for harvesting. It shows as an intensely white, level surface, glistening in the sun like a snowfield. Part of it is fine grained, but most is in the form of large crystals. Harvesting is commenced by shoveling the salt up into wheelbarrows, after the crust has been broken by plows. The crude salt is then heaped up into large stacks, and allowed to stand until needed. Rain has only the effect of purifying it, as the more soluble impurities are readily washed off the stacks while the more resistant salt is left.—*The World To-Day,* June, 1905.

THE CZAR GRANTS RELIGIOUS FREEDOM.—In Russia proper the expected disorders did not occur, possibly because of the timely Easter proclamation, granting for the first time religious freedom, and remitting $45,000,000 of debts owed by the peasants to the government for advances to the village communes during the recent stringency. In spite of the silence of the ukase on the subject of the Zemsky Sobor, to which all Russia has been eagerly looking, this prospect of liberty of conscience was hailed as the most significant event since the emancipation of the serfs, and the first evidence that the promises of the Christmas rescript would be carried out. The Church dignitaries had contended that religious freedom already existed; but while all religions were tolerated, nobody could leave the Orthodox Church without forfeiting all civil rights: a convert to one of the many sects, for instance, could neither inherit nor own property; and it is stated that hundreds of thousands have been deprived of their belongings and even exiled to Siberia for such changes of belief. The adherents of the "Old Faith" number nearly seventeen millions, and include many of the wealthiest merchants of Moscow; their altars had been sealed up for twenty years, and they had been subjected to unceasing persecution. When the Czar, accepting the statement of the Metropolitan Antonius that "you cannot hold strange children in the Church against their will," abandoned the historic policy of crushing conquered provinces into national unity by a rigid prescription of religion, there was a dramatic scene in Moscow. These "Old Believers" gathered there to celebrate Easter in churches which had been closed for a generation—to find many priceless paintings and relics spoiled by the mold and dampness of years. The decree not only removed the disabilities of all Christian sects, but also gave equal rights to some millions of Mussulmans and Buddhists, who were "to be called pagans no longer." Only the Jews were exempted from the provisions of the act, nothing at all being conceded to them.

The continued anarchy in the Caucasus brought about the appointment of an agrarian commission under M. Goremykin to aid and advise the peasants; but it is admitted that no practical results can follow for months.—From *World's Work,* June, 1905.

THE POWER TO TEST GEOGRAPHIC INFORMATION.—Certain classes of papers and periodicals are so full of geographic inaccuracies and impossibilities that every child should learn from his school geography work how to cull the good from the bad and how to recognize absurdities, no matter how large and glaring the type and how alluring the pictures. All that is set in type is not necessarily accurate or true.

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THE FIELD WORK OF A PHYSIOGRAPHY CLASS ON A GLACIAL PROBLEM

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NO outdoor physiographic work is more interesting to the average pupil than a study of forms of glacial deposition. For developing ability in observation and power in reasoning such work is of great value. A description of the methods of work successful with a class of high school pupils, and the results obtained, may be of interest.

The class was one of pupils of the Punchard School, Andover, Mass. There is in Andover, near the Ballardvale Station of the Boston & Maine Railroad, a typical esker and an associated glacial delta. No complete description of the forms is attempted here; simply an outline of the work is given, and a student's report, condensed, follows. Plans are also included as they show somewhat the possibilities of study afforded in the place. These possibilities are, however, not unusual, but rather, typical: possibilities as great may be found in almost any glacial region. The student's report is, obviously, incomplete and faulty, but is typical of what a pupil of high school age can do.

The class made, first, one excursion for general observation over the whole field. On this first trip note-taking was not encouraged, but thought and constructive imagination were appealed to in every possible way. The outline of work was then given. This outline was dictated to the class in order that each point might be explained as fully as necessary; experience has taught that nothing is so discouraging to a pupil as the feeling that he does not know what is expected of him. Putting the points of the outline in the form of questions gives a definiteness which is helpful to the pupil. This outline guided the work of the class in later excursions and served as a guide in making out the reports. Each pupil was furnished also with a map of the locality; these maps were photographic enlargements of a portion of the regular U. S. Geol. Survey sheet.

OUTLINE TO GUIDE STUDY OF THE ESKER AND GLACIAL DELTA AT ANDOVER, MASS.

I.

1. What is the location of the district studied?

II.

1. Describe briefly the form named *esker*.
2. What is the length of the part of the esker which is joined to the glacial delta?
3. What is the average height?
4. What is the angle of the sides?
5. Draw a profile cross-section, to scale, of the esker.
6. Draw a plan, to scale, giving compass directions.
7. Draw a profile longitudinal section, to scale.
8. Of what material is the esker made?
9. Collect samples as far as possible, typical of the material of the esker.
10. How does the ridge connected with the delta end on the northwest?
11. Describe the continuation of the esker found farther northwest.
12. Explain the break in the esker, that is, the separation of the short part of the ridge, connected with the delta, from the main part of the esker, farther northwest.
13. Are there any evidences of stratification in the esker?
14. How do you think this esker was formed? What do you think is its relation to the sand-plain connected with it on the southeast?
15. Outline the esker on your map.

III. *The Glacial Delta.*

1. Outline on your map the delta.
2. What is its extent and form?
3. What is the "ice-contact" slope? Average angle of this slope?
4. What part of the formation is really a plain?
5. Describe the margins of the delta other than the ice-contact slope.
6. Draw profile sections. Indicate on the map the lines of these sections.

7. Of what material is the delta composed?
8. Are there evidences of stratification? Describe.
9. Where in the delta is the finest material?
10. Where is the coarsest?
11. Collect samples, as far as possible, of the typical materials found in the formation.
12. Describe, with drawings, the kettle-hole found near the "ice-contact" slope. Cause?

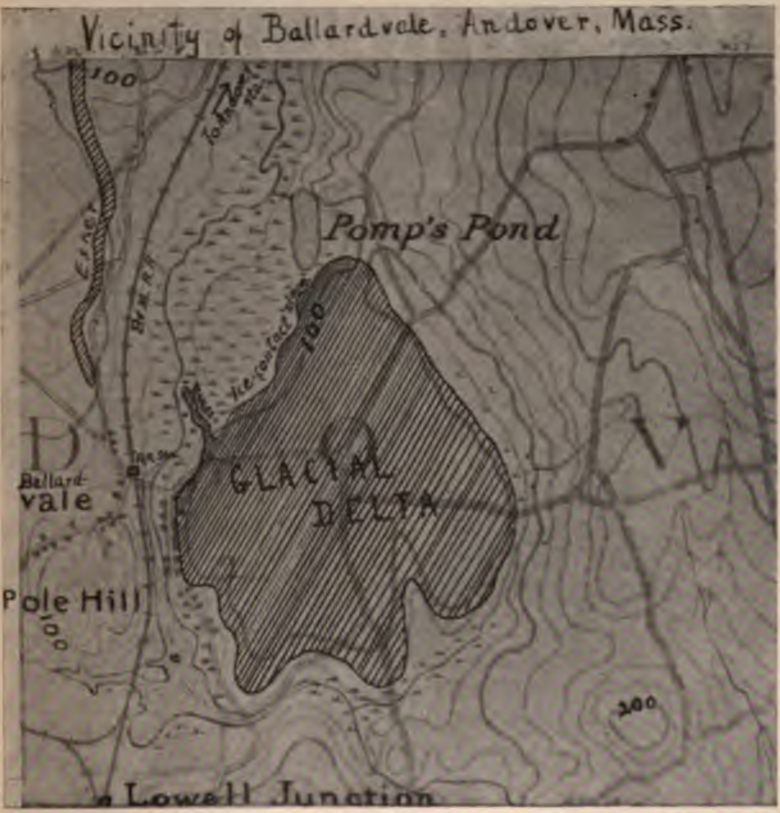


Fig. 1. Scale 2 x $\frac{1}{62500}$. Contour interval 20 ft. Enlarged about twice, from Lawrence, Mass., U. S. Geol. Survey Sheet.

IV. *Erosion.*

1. What work has recent erosion done on the delta? Make sketches.
2. What causes have made erosion rapid?

What is the rate of erosion on the ice-contact slope?

3. Describe the alluvial fans made.

Drainage.

1. Show on your map existing streams, ponds and swamps.
2. Describe the course of the Shawsheen River with respect to the formations described.
3. What may be the correlation of glacial deposits and drainage, past and present?

(PUPIL'S REPORT)

The Esker and Glacial Delta at Ballardvale, Andover, Mass.

I. *Locality.*

The esker and glacial delta, which our class in Physical Geography studied during April and May, 1905, are situated at Ballardvale, a district south of the town of Andover, Mass. They are on the east side of the Shawsheen River and not very far from the Ballardvale railway station of the "Boston and Maine".

II. *The esker.*

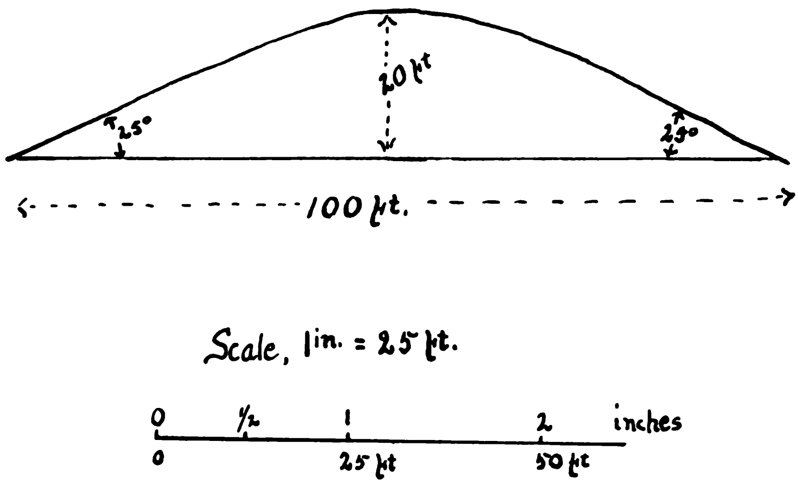
A narrow ridge, sometimes miles in length, composed of different grades of gravel, having an irregular, serpentine course, and gently sloping sides is called an esker.

The esker of Ballardvale, east of the railway, is joined to the glacial delta on the south. The length of the part of the ridge joined to this delta is about nine hundred feet. The height is, on an average, twenty feet for the entire length and at the northern end the angle of the sides is twenty-five degrees.

Figure 2 shows a profile cross-section of the esker, at the end near the river. The height of the ridge is twenty feet and the width one hundred feet. The angle of the sides is about twenty-five degrees. Figure 3 shows a plan, to scale, of the esker. Starting at the northwest end of it and continuing southward for two hundred and seventy-five feet we find that it has the direction of thirty-seven degrees east of south. Going one hundred and seventy-five feet further, we find that the ridge has turned two degrees more to the east. For seventy-five feet more it is twenty-two degrees east of south. It continues in this same direction for one hundred and ten feet more. It now gives a sharp turn in the opposite direction, being south twenty-eight degrees west for fifty feet. It now goes due south for one hundred feet and merges into the glacial delta. The width, nearly all the way is about one hundred feet. Figure 4 is a profile longitudinal section, to scale, of the esker. At the northwest end it is twenty feet high. Continuing two hundred and seventy-five feet further we find that it has become twenty-six feet high. Going on for one hundred and seventy-five feet we find that the height becomes twenty feet. At a distance of seventy feet farther the height is twenty-four feet. It decreases greatly for the next one hundred feet, the height becoming only fourteen feet. It rises a little in the next sixty to the height of eighteen feet. It now rises to the height of twenty-two feet in the last one hundred feet.

Fig. 2.

Profile cross-section of esker, northern end of the part east of the river.



The esker is composed of gravel and stones, some small, others nearly as large as one's head; all are rounded and with no sharp corners, showing that they were once under water. We also found that, in a place west of the river, where some material was being dug out, there were signs of stratification. This shows that the material must have been laid down under water. Samples of the material have been collected and are in the laboratory.

On the northwest the esker slopes off, at an angle of twenty-five degrees, to the floodplain of the Shawsheen River.

There is a continuation of the esker farther to the northwest. It extends in a serpentine course, more or less broken, in a northwesterly direction. It is wider and higher than the part near the glacial delta and the material is a great deal coarser.

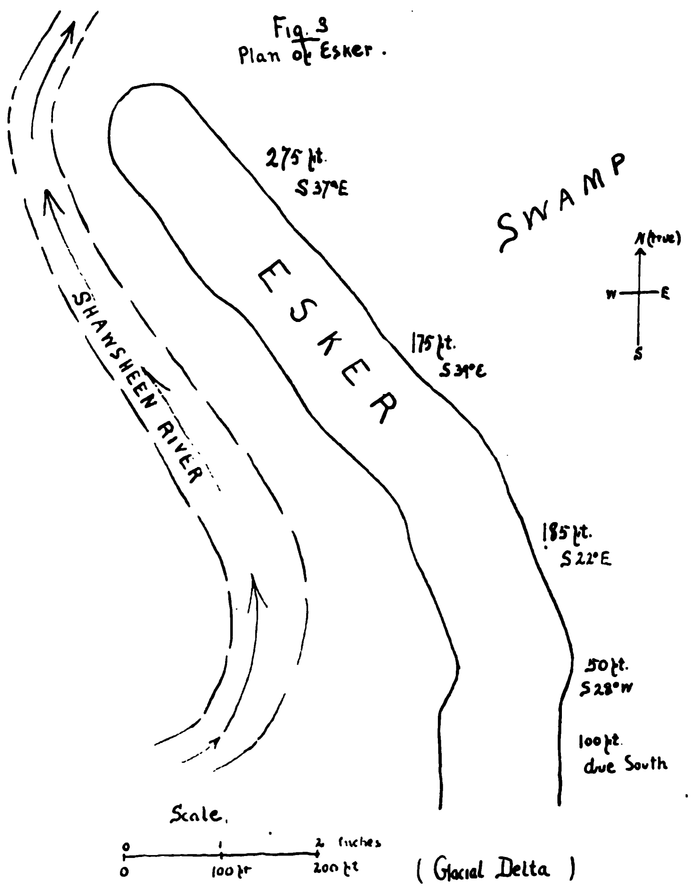


Fig. 3
Plan of Esker.

It is not quite certain how the break, which is seen between the two parts of the esker, was formed. There may be one of three reasons: First, it may have been there in the earlier times when the esker was first formed. Second, men may have dug it away. A third and most likely the correct reason is that the river, which turns at nearly a right angle at this place, may have cut through the esker.

It seems reasonable to suppose that this esker was formed by a subglacial stream which rushed forth from its tunnel under the glacier carrying a great quantity of material. The coarser material it was forced to drop first, in the stream-bed, building the esker; but some of the finer was carried farther, probably into a glacial lake, forming the broad, level-topped glacial delta.

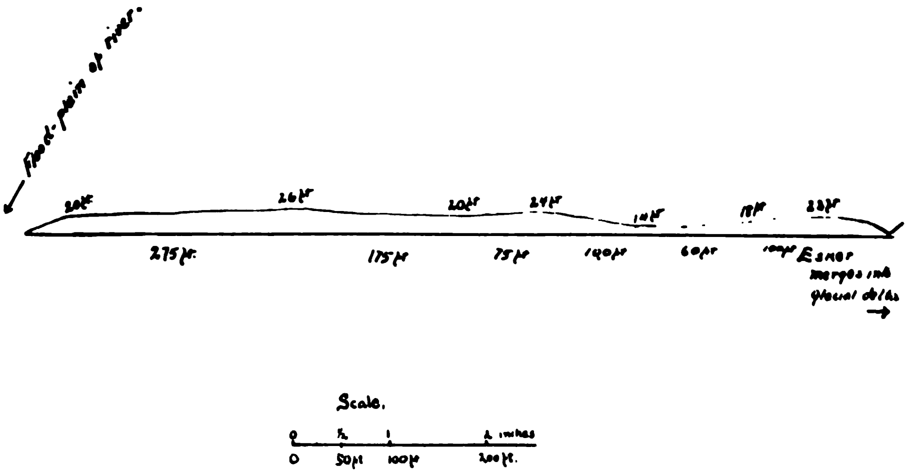


Fig. 4
Profile longitudinal section of esker
East of the Shawsheen River.

III. *The glacial delta.*

The glacial delta is a fan shaped, level-topped sand plain, with the handle of the fan represented by the esker.

The ice-contact slope is a steep slope on the northwest of the sand plain, sloping off towards the swamp bordering the river. The average angle of this slope is twenty-eight degrees.

The top, central part is a plain sloping off in all directions. The slopes of the margins are much less steep than the ice-contact slope.

The map (Figure 1) shows the general shape and extent of the sand-delta. The height of the top above the swamp north of it is about ninety feet.

The delta is composed of different kinds and grades of material from the finest sand to the coarsest gravel. Samples of the material are in the laboratory. The coarsest material is on the northern side, near the ice-contact slope. The reason for the finest being where it is, far out towards the margins, is that the stream coming out from under the ice dropped the coarsest material first, but as the finer material was lighter it was carried further out into the lake which was probably there at the time. There are evidences of stratification in the glacial delta, showing that the material was laid down by water. The stones in the delta are all rounded, water worn.

In the plain there are several deep holes, with sides sloping in from all directions, called kettle-holes. The side towards the north is the lowest. The kettle-hole which we noticed, the principal one near the ice-contact slope, is about thirty feet deep, two hundred feet long and the angle of the sides is about thirty degrees. It was probably formed by a large block of ice which broke off from the glacier as it was retreating back. Gravel covered this big block of ice and when the ice melted the gravel settled, forming a deep hole.

IV. *Erosion.*

There has been much erosion in the glacial delta, especially near the ice-contact slope. Deep gorges have been cut and during a heavy rainfall water rushes down these gorges, carrying material along with it, which it gets from the sides and bottoms of the gorges. The streams have to drop the material at the foot of the slope, forming fan-shaped, sandy alluvial fans. Many trees have been cut recently making erosion much more rapid than it would otherwise have been. In one place where a large tree has been cut down the roots remain and have hindered the erosion in that place. The rate of erosion backward into the plain, is about twenty to twenty-five feet a year. As the soil is rather loose and sandy it is easy to cut into it.

At the base of the ice-contact slope are the alluvial fans or fan cones. Each one is being built by a stream which in time of a heavy rain, rushes down the steep slope. At the base the velocity of the stream is checked and the sediment is there dropped, forming the fan cones. There are many distributaries crossing the fans, which lead to a small pond.

V. *Drainage.*

The main stream, in the district which we studied, is the Shawsheen River. There are several ponds, streams and many marshes as are shown on the map. The river has two sharp turns in it, one at each end of the esker along which it flows. Streams surround the glacial delta but none cut across it.

It is noticed that in the report several questions are incompletely answered or wholly unanswered. No complete answer can be given to some of the questions. The knowledge cannot come too soon that questions unanswerable, with present information, are just as warrantable as others. If all that is asked is answered the pupil is apt to think that all could be answered that could be asked.

The above report is a condensed form of one made by a member of the class who is a second year pupil in the school. All pupils of the class contributed some points to the general understanding, as there were many class discussions of the problems presented in the area.

OCEAN AND LAND TRANSPORTATION.

THE most pronounced and far reaching difference between ocean transportation and land transportation arises from the fact that the ocean is a highway without the efforts of man, and the navigator has but to provide his vehicle. By land roads must be made even for a pack train, and with the railroad, the modern type of land transportation, the building of the roadway is much the greater part of the necessary equipment. For carrying upon the ocean the completion of the ship is all that is necessary, and if she sails the winds of Providence will drive her into all seas and around the world. This fundamental difference in the ocean trade produces many peculiarities unknown upon the land. Because of the smaller capital that is required upon the ocean, we find more individuals and groups of individuals acting independently than we do in the railway traffic of the land. The single vessel operated as a unit has as much independence as the great line of steamers, and in some respects more independence. Both are alike free to pass over the high seas, to take advantage of the government surveys thereupon and to enter the harbors that connect with the land.—From *The Organization of Ocean Commerce, by J. Russell Smith.*

MAP DRAWING

BY LYMAN R. ALLEN

State Normal School, North Adams, Mass.

"DO you promise to tell the truth, the whole truth, and nothing but the truth?" No map may unblushingly reply, "I do." None in common use can meet even the first requirement. Do you doubt it? Then glance at the maps of one continent, here reproduced from different standard text-books. (Fig. 1) "Which is right?" "That depends upon the point of view" the maps will reply. Or reflect a moment: the earth's surface is nearly spherical; our maps are commonly plane; can one paste a map of the eastern hemisphere on the globe smoothly, leaving no gaps, fitting exactly? or remove and spread flat the paper surface of a globe? All our maps represent distorted views; they view the globe in different positions and from different distances.

With increased distance (or decreased map scale) inaccuracies increase. The width of a line becomes an inch—a foot—a mile; a circle, compass-drawn, includes in the width of its pencil-line the total flattening at the poles and our highest mountain tops and lowest ocean depths. On a continental map a single swing of the coast line includes hundreds of capes and bays, which could never be separately drawn or distinguished on such a map.

It is hardly necessary to add, then, that our pupils cannot draw accurate maps. Ought it ever to be a serious question whether it is worth while to attempt exact reproductions of maps—themselves never perfectly accurate? Exact reproduction may be much more profitably undertaken in mechanical and machine drawing, with more enjoyment to teacher and pupil. Certain knowledge of conventional map forms, as of certain leaf forms, is necessary; but it should be of general form, proportion and size,—not of minute details; just as we know, to recognize or draw from memory, the form of the oak leaf, but not the peculiarities of an individual leaf.

Every map is a shorthand record; or it speaks a language foreign to us for our translation. Many of us read in it principally the printed words; we tell the relative position of the words, their order (showing the order of station names we may read from our train). We forget they are truly symbols which attempt to speak to us and to make us think; symbols which "represent" or "stand for" real things; symbols which, when we are expert, help us to abbreviate thinking. The symbol of a mountain, for example, brings up to us, when we attend strictly to it, all that we know of mountains from seeing, from climbing, from pictures, from descriptions;

it lives with us, as pages of mere words could not make it; if, however, we are studying rainfall, we think merely "a mountain here which has certain effects," and on these we focus our thought. What an advantage over the verbal description! There we must skim it all; here we single out those ideas we need for the time and push back all others to the margin of consciousness.

These foreign tongues our pupils must acquire. This is a crucial point in Geography—that upon which depends the power to roam over the whole earth and enter into living relations with all its people.

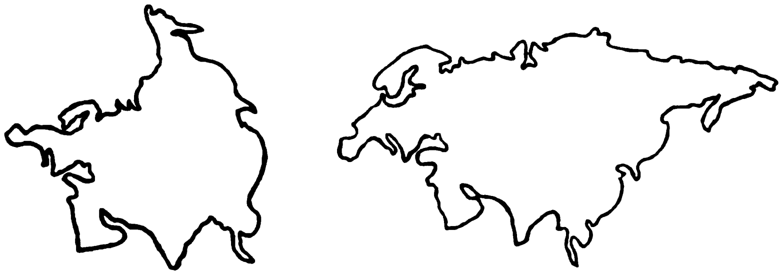


Fig. 1

Real things, if such are to be recalled by symbols, must be our starting point. There is no particular reason why caterpillars crawling over spaces enclosed by wiggly lines should signify mountain systems unless one has seen shore lines (contact lines of land and water) and slope lines (on hills or sandpiles); or why a writhing blue line should mean a river unless one has drawn the neighboring river to large, then smaller and smaller scales. Then sketch, say, some familiar hill; draw it to scales successively decreasing; recall and re-travel in the schoolroom this familiar form from its new symbol; imagine an unknown similar hill by the aid of the same symbols—here, in a nutshell, is the principle underlying all map study. If these lines (Fig. 2) mean to your pupil a hill, double-peaked; if he can trace its divides and peaks, climb up by easiest and by quickest routes, there will be little difficulty in teaching him the use of our geological survey maps, available for our own localities, in most cases, and at merely nominal cost.

In map drawing, as in much else in Geography, the railroads offer valuable help and significant hints. Can you find a transcontinental road which is not (on its own folders) the straightest, largest, altogether the most important one? "If you must change cars we will show connecting roads in light lines; if you are curious as to rivers, mountains, or state lines, we will hint at those. But our line is the important thing for you to know!" This is what the folders seem to say.

Such railroad maps bring one feature to the focus of attention; it is seen as never when a hundred other details are given. Look at a map showing the rivers alone of the United States (Fig 3). What a revelation in the number of subjects—historical and geographical—which disclose themselves or appear in a new light; mountains, slopes, rainfall, water power, vegetation, irrigation; or pathways, exploration, rapid colonization, industrial development, national unity instead of "North and South" sectionalism. How much better is this, or a simple relief map, than a modern political map for teaching the Louisiana Purchase or the Lewis and Clarke Expedition! Geological maps follow the same principle and emphasize by color one set of facts. We may imitate in our schools by maps of single river systems, with fullness of details; by large outlines of single countries or states; by isolated coastlines—as of Greece, Maine, New Jersey, South Africa; by climate maps showing rainfall, isotherms, or winds; by production maps, showing one (or sometimes two or three) mineral, plant or animal products by coloring the producing regions. You have not such maps? Then let the pupils make them; trace—enlarge by pantograph—have the most accurate reproductions possible. The maps are drawn for class study; it is a part of real life, not "just school." This may constitute a second phase of map drawing.

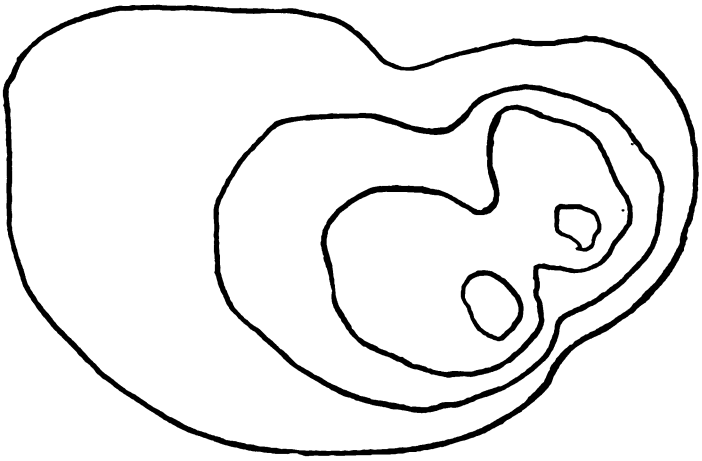


Fig. 2

Map drawing is also a means of testing the knowledge of the pupils. It has been said that the general shape of certain land masses should be known; those to be included are scarcely more than the continents, the United States, the state, and the town; these should be so known as to be instantly,

unerringly recognized—quickly, boldly, and accurately drawn. Then again, outlines of these are extremely valuable as frames within which to put details of mountains, rivers, cities, productions, railroads, climate, etc. Here the test is in the details, not the outline of the continent; for such testing printed outlines are best, such as may be obtained from D. C. Heath and other publishers. If such are too expensive teach the children

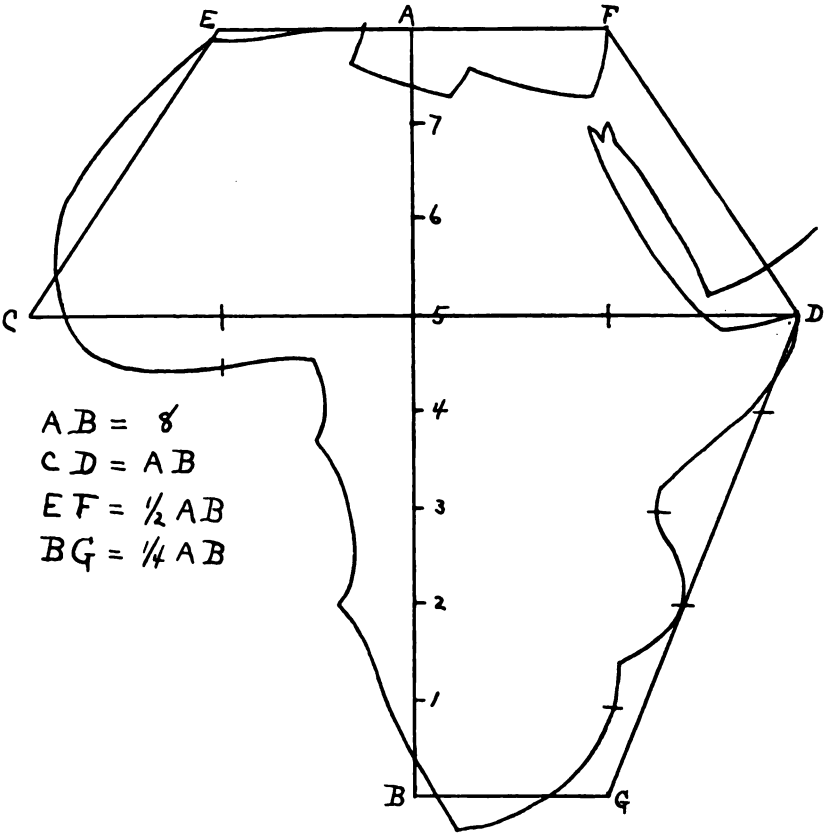
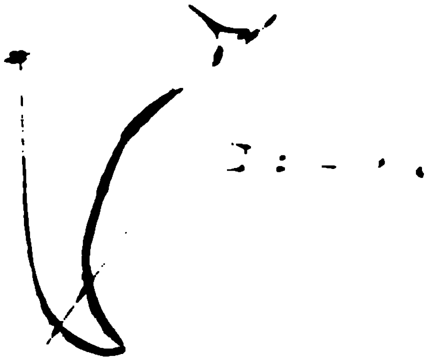


Fig. 4

to draw their own. The simpler, more generalized they are, the better; this because they may be more quickly drawn (without waste of time) and accurately—hence are a fair basis for the succeeding test. Bold,' general strokes, which tell the story, serve best; wiggly, painstaking lines, drawn with laborious care, are totally unsuitable. As in sketching from objects, proportions must be correct; these should be discovered from the generalized outline (Fig. 4); then memorized and applied. Construction lines



B.

may be drawn in the early stages of practice—dots merely at a later. Accuracy—of memory and of drawing—and boldness are to be insisted upon at first; speed later. The former will be attained by much practice, on paper and blackboard, under careful criticism; arm movements must be secured. Speed may then be attained by strictly limiting the time—watch in hand. Emphasize the scale of the map (the length of unit line) for the sake of knowing relative size—not for any aid in drawing.

In drawing the more irregular continents it may be better to rely upon the sense of proportion and of relative position instead of attempting to discover and memorize simple mathematical proportions; quite likely pupils of artistic feeling rather than mathematical instincts may find this better for all maps. In this case the equator, tropics, or other standard circles which cross the continent should be added; they help in the drawing as well as in fixing in mind the relative position on the earth's surface. Figure 5 will illustrate this way of working. It may be read to discover the successive steps in simplifying the outline, even to whatever straight lines seem simplest to the individual; or, conversely, the steps in memorizing or constructing the outline from straight lines, of relative length and position definitely visualized, to more and more detailed sketching of the outline.

The accompanying illustrations may at first glance seem startlingly crude. Are they unmistakable? simple and accurate in proportions? quickly drawn? suitable frames within which pupils, even if of unequal drawing ability, may recite upon measurable equality?

Map study and map drawing are vital in geography. Study then, those maps which are most accurate and appropriate for your particular object. Draw maps to learn the symbols—to prepare special maps otherwise unavailable—to test accuracy of study and power of expression. Throughout, clothe them with reality by the use of pictures, descriptions, literature, and by all that reasoning can tell lest the use of mere symbols shall shrink and formalize knowledge.

GEOGRAPHIC DEVELOPMENT OF SEAPORTS IN THE UNITED STATES

BY BESSIE A. BROWN
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WHAT are we to understand by the term "geographic"? This, first of all, it seems to me, must be pretty definitely ascertained. "Physiographic, as distinct from 'geographic,' includes the physical environment, as climate, soil, topography and the distribution of resources. 'Geographic' includes, not only the physical environment, but the human element as well."[1] It is in its broad meaning, which includes an account of man and nature, and the interactions which are an outcome of their relationship to each other that the term is here used. "The interaction of man and nature," again says Professor Trotter, "finds its expression in the productive transportation and consumption of goods."[2]

Granting then, that the relation between the physiographic and the human elements in commerce is only a phase of utilizing the resources of the earth, we shall proceed to consider what in the physical make-up of the United States has favored her commercial growth and made her the nation she now is—"the third commercial country in the world having more than 10 per cent. of the world's trade."[3] The conditions offered for industrial growth are perhaps of first importance. "The almost inexhaustible resources of iron and coal and the development of cotton raising in the South have made her one of the greatest manufacturing countries of the world,"[4] and "the development of the agricultural possibilities has created such a wealth of breadstuffs and provisions available for commerce that she has become the principal country furnishing food to Europe."[5] The mineral deposits are not only rich and of great variety, but so placed as for the most part to be readily accesible. Rarely does a country combine such mineral wealth with so fertile a soil.

There are nowhere more fruitful regions; and these, together with the vast forest and pasture regions, give her a varied and widely distributed industrial wealth. The cardinal facts involved in this distribution are, that no one section is self-sufficing, but dependent each section upon the other, for its maintenance as to food supply, raw materials for manufacture, and finished products; and that the distribution of these commodities depends upon transportation facilities which are largely conditioned by topography. Owing to these facts there has, therefore, originated a movement of products from one region to another which has become organized into an extensive internal commerce, the bulk of which is made up of the movement of a few great staple products, grain, live-stock, cotton, lumber, fruits, coal and iron.

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[1] Trotter, "Geography of Commerce," p. 1.

[2] Ibid., p. 6.

[3] Dodge's "Advanced Geography," p. 182.

[4] Ibid.

[5] Ibid., p. 182.

In comparison with the movement of these few staple commodities the carrying of manufactured products is a small item. As a result of these natural resources we have the fundamental or "extractive industries,"—agriculture, stock raising, mining and lumbering, that form the basis of our national prosperity, upon which the "outgoing" or foreign trade likewise depends,—whether the material be in a raw state or as a manufactured product. "The underlying principle of internal commerce is," obviously, "largely a physiographical one;—the diversity of products which characterizes the different sections of the United States"[1] being the result of contrasted physical conditions,—climate and soil, as well as the wide and varied distribution of natural resources.

Before passing to a brief review of her historical development, let us for a moment consider the position of the United States and the commercial opportunities offered by her natural highways. Situated across the smaller ocean from the leading nations of Europe, her large and commodious harbors, formed, in many cases, by estuaries and river mouths, stand like so many "open doors" inviting the products, men, and ideas of other nations from beyond her "subject sea" to her eastern and southern shores, to which. through the numerous water gaps and the natural highways of commerce the products of the country have been cheaply and rapidly sent for exchange and further transportation. The natural highways of commerce, the lake chains and rivers, have always been lines of travel, and trails formed originally along the lines of least resistance by various wild animals, as the buffalo and deer, have often been successfully followed at later periods by the Indian, frontiersman, pack horse, wagon road, and railroad.

In the early part of the nineteenth century, before the advent of the railway, these natural highways were supplemented by a large number of canals, built for cross-country navigation, and to connect the river and lake systems, thereby, obtaining longer and continuous water routes. To-day the railroad greatly supersedes the water traffic, but the rivers of the United States, the "roads that run" have served an important part in promoting her commercial greatness. A brief review of the historical development of the country, from the first, makes apparent the fact that consciously or unconsciously the early settlers took advantage of and chose their places of settlement because of some one or more of the physiographic conditions which we have considered;—the matter of first consequence at the earliest stage was a good harbor for a "shelter in the time of storm."

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[1] Trotter. "Geography of Commerce" P. 132.

It was not, as Professor Brigham suggests, in the opening paragraph of his book, "Geographic Influences in American History,"—to which I shall again have occasion to refer, a "new continent that Columbus and the early discoverers sought, but a new path to an old world" for the purposes of trade with the east;—in short, greater commercial opportunities. A foreign commerce with the newly discovered continent was soon opened. As early as 1500 European craft began to visit the cod banks of Newfoundland, starting an industry which was soon followed, at other points along the coast, by fur trade with the Indians. "The shores of the continent were discovered and explored by piecemeal, generally from the south northward, each explorer opening up a little longer vista of the coast line."[1] The Spanish pioneers were followed closely by English and French mariners each of whom at once claimed for his country those portions of the newly discovered land which he had either discovered or explored. The Spanairds held the islands and seas of the south; the French occupied the St. Lawrence; and, in 1585, the breaking of Spanish power through the destruction of the Armada opened the way for the English to share, too, in the colonization of the new continent. A narrow strip of lowland between the Appalachian Highlands and the sea, extending from the French to the Spanish possessions, was left to the Englishman who made his home by the rivers of Virginia,—the first permanant English settlement being at Jamestown, in 1607,—about Massachusetts Bay, on the Delaware, the Chesapeake, and on the low coasts of the Carolinas south to the Savannah. The Dutch before him took possession of the best Atlantic harbor at the mouth of the Hudson along which he found a narrow, but open and easy road through the Appalachian wall between the seaboard and the prairies. Finally, in 1674, this advantageous possession was wrested from the Dutch by the Englishman, giving him, thereby, at the close of the seventeenth century a series of English towns commanding the best harbors and natural highways of the Atlantic coast and plain. These scattered settlements, Spanish, French and English which skirted our eastern and southern shores and destined in many instances, at no distant future, to become great commercial centers of the United States and of the world, were, at first, quite independent of one another, but more or less dependent upon the mother countries. This is especially true in regard to the commercial relationship that existed among the several English colonies. During the colonial period several efforts were made to unite the English colonies, but owing to their difference of origin, their wide spread separation,—for in those days distances were much greater than now,—geographic conditions, religion and social life there was but little sympathy among them, and many grounds for jealousies, until "breathings of discontent," heard many years prior to the actual outbreak of hostilities against a common enemy,—their mother country,— tended to bind them together for the purpose of resisting her tyrannical acts, many of which so materially affected their commerce. During the struggle for independence which followed, trade with the mother country was suspended and the colonies, to a greater or less degree, became dependent upon each other. Prior to the Revolution these colonial towns were, as has been suggested, markets where the country's new products were exchanged for the manufactured goods of England. They were essentially commercial, not industrial. Not until the close of the war, did the industrial phase of the country's development begin; and manufactures developed most rapidly in those parts of the country, during this industrial period, where from physiographic conditions the limited area of arable land felt the competition of other agricultural areas more favored by nature. New England more strikingly than any other section illustrates these conditions. Here we have an excessively glaciated surface with only a limited area adapted to agriculture, abundant water power, and a section of country accesible by sea to the outside sources of raw materials. For these reasons, therefore, the towns of New England became at an early date manufacturing as well as commercial, though their products were for a number of years limited in variety, simple in character, and formed but a small part of their exports. The Middle Atlantic Slope had not only those physiograhic conditions, which favored the early development of the manufacturing industry of New England, but, in addition, a situation in close proximity to the coal and iron fields so that here, as in New England, we find manufacturing interests early predominating. The southern section of the country remained for many years a purely agricultural region, and upon this and other arable regions, which were developed as the country became settled and agricultural interests expanded, the towns of New England and Middle Atlantic Slope depended for food supplies and raw materials in exchange for their manufactured goods. We have therefore, in the early part of the nineteenth century as a result of this industrial growth, or as its counterpart, in order of their development, a well established and growing, foreign, coastwise, and internal commerce, all most closely related to each other and the industrial development, we have but briefly sketched. These commercial and industrial aspects, because of their close inter-relation, cannot be divorced. Now one aspect—now the other—predominates, or both may be equally strong, contributing—each, its part, to a seaport's growth. However, though many seaports of the United States reflect the advantages of a transoceanic market and of a coastwise trade with other parts of the American continent, we shall again and again have occasion to note, as we now proceed to consider separately the chief commercial centers of our sea coasts, that the relative development of these once colonial seaport towns depends, as formerly, chiefly "upon the productiveness and accessibility of the regions served by them, or, in a single word, upon their hinderland and the facilities which they afford to shipping."[1]

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[1] Gannett, "North America," I, p. 291.

At the close of the nineteenth century, the chief seaports, in order of their importance as determined by the amount of tonnage entered and cleared in foreign trade were New York, Boston, Philadelphia, New Orleans, Baltimore, The Puget Sound ports, San Francisco, Galveston, Newport News, Mobile, Savannah, and Charleston.[2] Of these seaports, no one offers a greater opportunity than New York for a detailed study of the geographic influences that have contributed to their development. Here they are in unrivalled combination:—a magnificent harbor at the mouth of the Hudson River, a tidal estuary for a distance of one hundred and fifty miles;—over three hundred miles of wharfage and shore line;—steamship connections, not only with other ports up and down the Atlantic coasts, but with all the leading ports of Europe, South America and the West Indies;—connections with a great "hinderland," by natural and artificial waterways from which radiate railroads towards the western and southern states, vast in extent, rich in natural resources, and inhabited by a vigorous and energetic people. But, for her inland ways, New York might not have become, what she to-day is, the most important port in the country and the second largest city in the world, notwithstanding the perfection of her harbor. New York was surpassed as a seaport town by both Boston and Philadelphia until some years after the completion of the Erie Canal, conceived it is said by Gov. Morris, in 1803, who is reported to have remarked, "Lake Erie must be tapped and the waters carried across the country to the Hudson;"—considered by the legislature and surveyed in 1808;—finally opened between Lake Erie and the Hudson on Oct. 26, 1825, and paralleled in 1826, not only by what was the first chartered railroad in America, but also the first in a series of westward links, connecting New York and Buffalo and to-day known as the "New York Central and Hudson River R. R."[1] However, from the time when grain and other products of the interior began to float down the Hudson by way of the Erie Canal the race for New York was practically won, and she became, inevitably, the chief metropolis of the Western Hemisphere. Here ships could come and get a return cargo on her docks, a condition of affairs true of no other city in the United States. Philadelphia and Baltimore have no such *favorable* opening into the Mississippi Valley and Boston is beyond the Berkshire barrier.[2] Professor Brigham has condensed into one epigrammatic paragraph the transportation facilities of the Hudson-Mohawk valley as they exist to-day. He says, "To sum up, the valley is now threaded by the ancient highways, the Erie Canal, six railway tracks and innumerable telegraphs and long distance telephones by which New York converses with Detroit, Indianapolis, Chicago, and other Western cities. The passing up and down, day and night, of men, thoughts and commodities, is like the ebb and flow of tidal waves, whose course is only stayed as traffic rests on the docks of Europe and of more distant continents." He also points out in the same chapter that within the counties bordered or crossed by the Hudson River and Erie Canal are to be found four-fifths of the population and nine-tenths of the wealth of the Empire State!

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[1] Chisholm, "Handbook of Commercial Geography," p. 56.

[2] Ibid., p. 494.

Philadelphia, for a number of years the seaboard rival of New York, now, among the country's chief seaports third in rank, and situated by the estuary of the Delaware, has through natural highways, like New York, access to the Mississippi valley, though none, however, offer the superlative transportation facilities of the Hudson-Mohawk valley. This valley route has been and is a steady menace to the trade of Philadelphia, though during the early decades of the nineteenth century the men of Philadelphia thought they held the geographic key to the inland trade, and had many and varied schemes by which they went on rivers, lakes and short canals to the Ohio and surrounding country. However, New Yorkers, who, at the same time, insured the goods shipped, and gave easier terms of payment for transportation, held the advantage by way of the Hudson valley, which has well been called the "Gateway of the American continent," together with the Mohawk Valley, and "anticipated even better days, for the Erie Canal was then under way." Before the advent of the railroad, these briefly were the transportation facilities afforded by the "hinderland" of Philadelphia as compared with the "hinderland" of New York. Though the roadways extending from Philadelphia and the Chesapeake country were numerous, nature offered no commanding route by which the commercial supremacy of Philadelphia could be assured. What are the conditions since the development of the railway? First, and obviously, this, the Hudson-Mohawk Valley is still not the only route by which we may reach by rail the Mississippi Valley and the West, but it is a "broader gate with a lower threshold" than that offered by way of the Susquehanna. Secondly, none of the great railways by the more Southern routes pass the Appalachian belt at an altitude, as at Rome, N. Y., of 445 feet. And, thirdly, because the railroads south of New York must "cross difficult divides rise and fall between low altitudes and heights of nearly 1800 feet"[1] they are constructed and maintained at a much greater expense and rates of transportation are correspondingly high. These briefly, are the conditions which tend to limit the amount of traffic by way of the southern valleys and hence the opportunities of Philadelphia, for commercial growth. However, despite the fact that Philadelphia, now as formerly, appears at a disadvantage when we compare the geographic influences that contribute to her growth with those of New York, it is at once apparent, when compared with the other seaports of the United States, that her opportunities for industrial and commercial development are in no sense small. Situated, as we have said, on the Delaware, practically at the head of navigation, in close proximity to the iron and coal producing regions, she has become a great industrial center, important, especially, for the manufacture of carpets and rugs, woolen and worsted goods, and finished leather, together with the products of her foundries and machine shops. Philadelphia, because of her situation, is also a great coal exporting city particularly to the towns along the coast, though her foreign trade is considerable.

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[1] Brigham, "Geographic Influences in American History," pp. 20-26.

Ibid., p. 26.

During the early stage of their development both New York and Philadelphia became anxious lest the farmers and traders of the "New West" send their goods to New Orleans and thereby favor her growth at the expense of theirs. That their fears were not without basis, her position to-day clearly shows. At the close of the nineteenth century, she not only ranked as the fourth chief seaport in the United States but had become the chief cotton exporting city in the world.[2] Her growth has been largely due to the industrial and commercial development of one of the most productive "hinderlands" in the country, abundantly supplied with natural highways for transportation, upon which the country depended, until the development of railways, by means of which the great bulk of traffic is now carried on. To-day four-fifths[3] of the products entering the city come

[1] Brigham, "Geographic Influences in American History," p. 25.

[2] Dodge's "Advanced Geography," p. 148.

[3] Adam's "Commercial Geography," p. 160.

from this interior by rail, river and canal. New Orleans, therefore, as the natural outlet of the Mississippi Basin and the focus of carrying trade lines in the Gulf has become one of the chief seaports of the country and promises to become one of the great exporting points of the world. "In 1901, she supplanted Philadelphia in the third place in the list of grain exporting cities being outranked only by New York and Baltimore. In the fiscal year ending 1902, her grain exports were 36 per cent. more than those of Philadelphia, and very nearly equal to Baltimore. The last two years have seen the total foreign commerce of the Crescent City increase 56 per cent." In regard to the other Gulf ports Miss Semple says,[1] "The steady industrial and commercial growth which has been going on in the Southern States in the past decade has been suddenly accelerated by our increasing interest in the Carribean Sea," and that the "balance of commercial activity" because of our closer relations with Cuba and Porto Rico is now tipping towards the Gulf seaboard. The evidence she says is to be found in the statistics of exports and imports of New Orleans, Galveston, Corpus Christi, Mobile, Pensacola, Tampa and Key West; and that the development of New Orleans may be further tested "by the eagerness of certain big railroad systems of the Mississippi Valley to reach New Orleans. This purpose reflects the existing trend away from the Atlantic seaboard cities towards the Gulf."[2]

The influence to be exerted by the Isthmian canal is already a matter about which there is much conjecture. Galveston, the only other Gulf seaport we shall consider separately, is an extremely important cotton port owing to her position near the great Texas cotton fields. Despite the disadvantages of a poor harbor, maintained at great expense, she has a large foreign commerce, especially with Germany and France. To appreciate the part the exportation of cotton has had, and is having, in the commercial growth of our Southern Atlantic and Gulf seaports, we need only to compare the production of the country as a whole, in the past and present, with the total amount produced. In 1791, the United States furnished less than one-sixth of 1 per cent. of the cotton importation of Great Britain, while in 1899, 80 per cent. of the world's supply was furnished by the United States.[3] Charleston and Savannah as the natural outlets of the agricultural products of the regions in which they are situated have become the two most important seaports of the Southern States of the Atlantic Coast. Because the coast is generally bordered by barrier beaches and the extensive lagoons formed behind them are too shallow to form good harbors, the trade of these seaports is largely with New York, Philadelphia, and Boston rather than with foreign ports.

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[1] Semple, "American History and its Geographic Conditions," pp. 417, 418.

[2] Semple, "American History and its Geographic Conditions," p. 418.

[3] XII Census of U. S., Vol. VI, Agriculture, Part II, p. 405.

To trace the geographic development of Baltimore is hardly necessary since it follows in the main that of Philadelphia, also a "Fall Line" city. Her situation at a point where the Patapsco river falls into the Chesapeake, in the midst of the agricultural region of the Piedmont Belt and Coastal Plain, from which products are sent for manufacture and shipment, together with her excellent railway connections with the North, South and West has made her a growing commercial center; notwithstanding, she is at a disadvantage in securing trade with regions lying west of the Appalachian Highland owing to the fact that her railroad to the West has to follow more difficult grades than the western roads centering at Philadelphia and New York.

The geographic influences that have contributed, in general, to the development of all New England cities, namely, cheap water power, transportation facilities, accessibility to regions producing raw materials, and population abounding in energy and inventive genius have already been considered. The manufactured products of many of these great industrial centers find an outlet by way of Boston, which is surrounded by no less than twenty cities, all of which are important in some line of manufacturing and within an hour's ride by rail. To these and all New England cities engaged in manufacturing, the raw products of the South and West must be brought. Boston's railway facilities and situation on one of the finest harbors in the country have made her one of the chief receiving and distributing ports for these raw materials. She has not only an extensive coastwise commerce with New York, Savannah, and the West Indies but is also connected with the large cities of Central Massachusetts and the West by two railroads which bring great quantities of wool, cereals, and provisions,—a part of which is exported to Europe. These influences that have been most instrumental in making Boston the chief commercial city in New England and next to New York in rank, have in the main been the most vital factors in the development of all other New England seaports.

The commercial cities of our Pacific coast have developed upon the only two great inlets to be found throughout the entire length of Washington, Oregon, and California. These seaports owe their growth chiefly to the fact that they are situated at those places most convenient for the exchange of products of the "East" and "Far East." "Each of the cities which have developed on these inlets has transcontinental connection with the producing and consuming areas of the East and through them pass the products of the Far East." The recent development of our Pacific Coast ports is chiefly due to the increase in commerce with our Pacific possessions and the greater ease in getting to Asiatic shores, though trade with Yukon has contributed much to the growth of Seattle. San Francisco, the chief city of the coast, is situated on the best harbor, is connected with eastern cities by several routes and with the Pacific ports of the Old World by many steamship lines. She owes her rapid growth in the "fifties" to the ready entrance she furnished to the gold mining region,—the river valleys on the western side of the Sierra Nevada,—in 1849. In less than eighteen months after the discovery, California had a population of not less than 1,000,000 and San Franscisco in the meantime increased from 2,000 to 20,000 people.[1] Since 1880 the most notable changes in the seaports of our Pacific coast are the decline in the position of San Francisco and the rise of the Puget Sound Ports if the amount of tonnage entered and cleared in foreign trade is considered.[2] This relative decline in foreign trade in the case of San Francisco is ascribed to the "increasing importance of steamer as compared with sailor traffic and the concurrent development of transcontinental railway traffic. These circumstances have combined to draw away much of the trade of the hinderland of San Francisco to competing Atlantic ports." The rise of the Puget Sound ports is attributed "chiefly to the development of Alaska and the Yukon fields."

It has been no part of the plan of this paper to give statistics of commerce concerning the development of the seaports of the United States, but rather in the light of general principles and brief outline of the country's historical development to show some of the laws and centers of their growth. The relative importance of the two elements, man and nature, included in the term "geographic," and the result of the interactions which are, as we have seen, an outcome of their relationship to each other, have been admirably summarized, in the case of the United States, by Miss Semple. She says: "The vast size of the home country affording a wide field for raw materials, for concentration and hence organization of industries, for development of transportation facilities and maintenance of an extensive and varied domestic market has been in the past the dominant factor in the evolution of American commerce. The other factor has been the Anglo-Saxon vigor of character and tenacity of purpose. Here heredity and environment have combined to do their utmost and the result has not been small.

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[1] Gordy, "A History of the United States." I, page 296.

[2] Chisholm, "Handbook of Commercial Geography." I, page 494.

"The United States is to-day the world's greatest producer of manufactures, and as an exporter of domestic products it ranks side by side with Great Britian. The Atlantic has given us near access to Europe and the 'American invasion' has followed. The Pacific has opened to us though at longer range the markets of the Orient and the flag has been set free upon the outlying fragment of the Asiatic continent.

"Enthroned between her subject seas, the United States has by reason of her large area and her geographical location the most perfect conditions for preëminence in the commerce of the world ocean."[1]

AN IDEAL COMMERCIAL HARBOR

THE ideal commercial harbor probably finds its nearest approach in that of New York. It is a closed river harbor in a drowned valley. It is not obstructed by ice. A great river gives a highway to the interior, and with its deep and widened mouth, half estuary, half bay, holds enough water to enable a moderate tide to scour and keep open a sea entrance with but little dredging. Further than this the river is (and for an ideal harbor must be) wide enough to permit piers to be built out into the stream at right angles to the shore. By this means the space available for ships along a given amount of shore line is increased more than fivefold.

If a river, otherwise usable, is too narrow for piers, the vessels must lie in single row lengthwise along the shore. Upon this extravagant use of shore line no commercial city can depend entirely, because the ships that carried its commerce would be compelled to stop miles down stream to find shore space to unload and receive cargo. The Maas at Rotterdam is five hundred and forty yards wide, and the Elbe at Hamburg is little better; while the Hudson at New York and the Delaware at Philadelphia are each nearly a mile in width. A comparison of the maps of the harbors of Hamburg and Rotterdam with New York and Philadelphia will show at a glance the amount of work that man has been compelled to do because of the narrowness of the two European rivers. Instead of piers going into the stream seven hundred feet as in Philadelphia, a single row of ships lies lengthwise along the shore, and artificial harbors hundreds of acres in extent have been dug in the adjacent meadows to enable the shipping to be accommodated within the port.—From *The Organization of Ocean Commerce, by J. Russell Smith.*

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[1] Semple, "American History and its Geographic Conditions." P. 434.

WHAT IS GEOGRAPHY?*

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TO the educated mind confusion is always annoying. Its effort is toward definite conception and clear thinking. The progress of human knowledge is accomplished not alone by the discovery of new facts, but quite as much by the comparison, classification and orderly arrangement of all facts. This tendency to classify and define, to bring order out of chaos, is so fundamental that we often draw sharp lines of distinction where they do not exist in nature. If we undertake to divide our acquaintances into good and bad, smart and dull, handsome and ugly, tall and short, young and old, there will always be a certain number which are intermediate and do not fall into either class. If we decide to form a third or intermediate class our difficulties are doubled, because we have then to draw two dividing lines instead of one. If we accomplish the task it will be by making some artificial and arbitrary distinction. This is true in every department of human thought, and in none more so than in the definition of the various sciences or subjects of study. The attempt to erect a wall around the field of any science, to keep its contents absolutely separate from all other sciences, may as well be abandoned at the outset. The best that can be done is to find a central view point from which the field stretches away in every direction to a dim and indefinite horizon.

It is a notable fact that doubt, discussion and controversy concerning the limits of a science seldom arise among the men who are actively engaged in creating and perfecting it. The astronomer, the chemist, the botanist, are each too busy in cultivating the field which clearly belongs to him to waste time in debate over the border lands. He knows that his field overlaps those of his neighbors, that their fields overlap his and that there are wide areas held by all as tenants in common. The unity and interdependence of all science underlies and makes possible the division and specialization of sciences.

And so the question, What is geography? is a question of academic rather than of scientific interest. It is discussed much more among schoolmasters than among geographers, and the fact that it has been agitated most by those less fitted to decide it has contributed largely to confusion and disagreement. Who is so competent to say what botany is as the bot-

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anist who knows the science from the inside, and by personal work and experience has helped to create it? Is not this right generally conceded to him? Have you ever heard of a school teacher or superintendent or professor of pedagogy who undertook to define botany, or chemistry, or physics unless he was at the same time a reasonably expert botanist, chemist or physicist? Every science should be defined and organized by its own workers, by the men who have the most intimate knowledge of it, and no outsider has a right to be heard on the subject.

Here lies the trouble with geography, and the reason why we are still discussing its central idea, the limits and content of its subject matter, the number and nature of its divisions and their organic relations to one another. Geography in the schools has, as a rule, been defined and organized by people who were more interested in teaching than in the science itself. Hence the discrepancy between geography "as she is taught" and the geography of the geographers. It is the province of the pedagogue to take a science as he finds it and to determine what portions and aspects of it are most important, most profitable, most available for school instruction in various grades and conditions, and in what order and by what methods these ought to be presented to students. To do this well the pedagogue must have a broad view and some first hand knowledge of the subject. The only persons who have a right to an original opinion as to what geography is are the scientific geographers. A review of the birth and development of geography and an examination of expert opinion upon the subject will go far to clear up confusion, to end discussion and to show that there is reasonable agreement upon this much mooted question.

The dictionary tells us that the word *geography* means earth-description. Before a thing can be described it must be known; therefore geography implies a knowledge of the earth and of everything that belongs to it, from the unfathomed depths 4,000 miles below us to the unfathomed heights of the upper air, perhaps as many miles above us. Geography would thus divide with astronomy the whole realm of physical science, the one dealing with all the heavenly bodies in the universe, the other with this one terrestrial body upon which we live. Primitive geography had this broad scope, and traces of it have not entirely disappeared from text-books still in use.

"The foundation of geography," as Bain puts it, "is the conception of occupied space." Not only men but most animals have some consciousness that they occupy space, and that other objects have certain space relations to them and to one another. That sense of locality, direction and distance which many animals possess is of the very essence of geography. The squirrel has an intimate and practical knowledge of the geography of his hollow tree, the ant of its nest, the bee of its hive, while migratory birds extend their geographical knowledge across continents and zones, from Hudson Bay to Mexico and from Norway to Africa. The beginnings of geography are not only prehistoric, but prehuman. Primitive man learned the same kind of geography as the animals and in the same way. His very existence depended upon his knowing where he could find food and water, a cave or thicket for shelter, what roots and fruits are nutritious or poisonous, what animals he could use for food, and what animals could make a similar use of him. He was compelled to become acquainted with his surroundings. Every child to-day and forever must acquire the same knowledge in the same way, by personal exploration. To understand what geography is at the bottom it is necessary only to watch a bright and active child as he makes himself acquainted with his environment, whether it be a room, a door-yard, a farm or a city square. It does not take him long to find the way to the book case, the flower bed, the brook, the calf pen, or the candy store.

Geography primarily involves in the mind a sense of space relations with other objects, a consciousness of surroundings, a knowledge of some portion of the face of the earth and its contained features. The everlasting geographical questions are concerning any feature, Where is it? concerning any region, What is there in it? concerning any creature, What are its surroundings? Locality, contents, environment, constitute the subject matter of descriptive geography. * * * * *

It will hardly be questioned that geography includes in its subject matter, the following topics:

1. The earth as a planet: its form, dimensions, motions and relation to the sun.
2. The land: its outline and relief: the distribution of its surface forms including streams and lakes.
3. The sea: its outline, depth and contents: the properties and movements of sea water.
4. The atmosphere: its properties, conditions, and movements and their results as manifested in climate.
5. Plants and animals: their distribution.
6. Man: the distribution and movements of peoples: human conditions, industries, structures and to some extent institutions.

However elementary or exhaustive may be our knowledge of any of these groups of the phenomena the science of geography must consist in a synthesis of all of them, in a study of their relations to one another. Compare with this the scheme of organization insisted upon by many eminent educators in this country. Prof. Charles A. McMurry says: "Geography is the study of the earth as the home of man. The study of the earth alone; its phenomena and forces, its vegetation and animals, its rocks and atmosphere, is natural science, pure and simple. The study of man in his work and progress in his struggles and representative deeds, is history. The study of the earth as related to man is geography." This seems to be a statement of the Ritterian view, in its extremist form. According to this view, if the student studies the rocky frame of the globe and the effect of the atmosphere upon it, the process of weathering, degradation, erosion, he is not studying geography at all unless he considers them in their relation to human life, activities and institutions. According to the principles which prevail in all other "natural sciences pure and simple" he is studying the anatomy and physiology of the earth, which form the foundation chapters of geography, the first links in the chain of the geographic argument. If he never goes any farther, never brings human affairs into consideration, he has still been studying, not the complete round of geographic science, but a very important and essential part of it.

It is difficult to see what reason there is in the nature of things why the relation of the land to the sea and the air, the air to the sea, plants and animals to land, sea and air, are not as much a part of geography as any other relations; or if they are not geographical, to what science they do belong. It is also difficult to see why geography should be exclusively a human science any more than chemistry or geology. How would it do to define chemistry as the science of the relations between man's institutions and the composition and specific properties of bodies? or geology as the science of the relations between man's institutions and the life history of the earth?

Evidently the number of relations which exist between the phenomena of the same group and between the different groups themselves is very large, probably beyond the capacity of any one mind to grasp. But there are a few major relations which include the minor, and which can be made clear to primary students. These are the relations of land masses and ocean basins, the relations of relief and climate, and the relations of man to his whole physical environment. They form a cumulative series of increasing complexity everywhere traversed by other threads of relationship growing out of the phenomena of the earth as a whole. These form the "connected chain of geographical argument of which the earth's surface and man are the terminal links," the bridge which connects the purely natural sciences with the humanities. It is evident that the human relation is but one out of many links in the chain, yet it is the last link, the crowning relation, without which the argument is incomplete, and its largest meaning missed. If an intelligent inhabitant of Mars had paid a visit to the earth before the advent of man he would have found enough material for a science of geography to occupy him during several centuries. He would have found the round earth, lighted and warmed by the sun, diversified by oceans and continents, mountains and rivers, and inhabited by a million forms of life. If he had observed the distribution of all these, and had discovered and recorded their relations, would he not have been a great geographer? Yet man would have been unmentioned and unknown. If a man should accomplish a similar task to-day, or any considerable portion of it, even though he should omit all consideration of human affairs, could we deny his claim to the title of a geographer?

The innumerable facts which modern geography holds in solution may be crystallized along the thread of distribution, or mutual dependence in space, and this is the normal and legitimate development of the science from its primitive and popular form. That this is the view which prevails among eminent European geographers is evident from the following formal statements. Probably the most authoritative definition of geography ever made was formulated by the International Geographical Congress at Venice in 1881. It is not so clear and concise as an American educational committee would have made it, but it manages to say that "geography includes the study of the surface forms of the earth and the reciprocal relations of the different branches of the organic world," and is distinguished from other sciences by "indicating the distribution of beings, organic and inorganic, upon the earth."

Professor Hettner of the University of Leipsic, wrote in 1895: "The geography of to-day starts from the point of view of diversity in space, and aims at a scientific explanation of the nature of regions, inclusive of their inhabitants. Its task is to investigate the distribution of phenomena in mutual dependence."

Professor Neumann of the University of Freiberg, has recently declared as follows: "General geography deals with the general laws of the distribution of every class of phenomena on the earth's surface. Special geography describes and explains the various countries in their characteristic peculiarities of land and water forms, climate, vegetation, animal life, human settlements, and their conditions of organization and culture."

Professor Ule of Halle, defines the scope of modern geography to be "the investigation of the reciprocal effects of the several phenomena of a country, and their causal connection."

Mr. Mackinder of the University of Oxford, says "distribution is of the essence of geography."

Mr. Scott Keltie says: "Geography is the science of the topographical distribution of the great features of the earth's surface, and of all that it sustains, mineral, vegetable and animal, including man himself."

Prof. H. R. Mill, in his introduction to the International Geography, a recent work produced by the collaboration of seventy different authors from all parts of the civilized world, publishes the following formal definition which presumably bears the approval of his colleagues: "Geography is the exact and organized knowledge of the distribution of phenomena on the surface of the earth, culminating in the explanation of the interaction of man with his terrestrial environment."

If it be desirable to condense all these views into a concise formula, perhaps none better can be found than this: Geography treats of the distribution of all terrestrial phenomena in mutual dependence. Or to crowd all possible meaning into the word 'science,' ***geography is the science of distributions.*** If this be too indefinite by reason of brevity, it may be expanded by specifying that geography is the science which deals with the mutual relations of relief, climate, and life. This is essentially the same thought which Guyot expressed more figuratively when he said that geography views the earth as a living organism.

The field of geography then is the face of the earth, or that thin shell which includes the surface of the land, the lower portion of the atmosphere and the whole of the sea; for it is only within this shell that all the geographic factors, land, water, air, plants, animals and men exist and react upon one another. The business of geography is first to determine accurately the distribution of each and all of these factors; and second, to discover the causes which have brought about the distribution of each; and third, to explain the relations of each factor and group of factors to all the rest.

The development of geography has been traced through two stages: (1.) the descriptive, and (2.) the scientific. The descriptive stage consists of an accumulation of facts, an inventory of the large features of the face of the earth. Its results are best expressed by means of maps showing the distribution of land and water, relief forms and drainage systems, temperature and rainfall, forests and prairies, steppes and deserts, people and nations, cities and towns, roads and sailing courses, products and institutions. These must always form the foundation courses of geography. The descriptive stage is not yet completed, and is not likely to be soon. New discoveries are being made every day, not only in the less known regions, but in those which have been most thoroughly studied.

In the scientific or explanatory stage geographic study is extended to other relations than those of position and to the causes which have brought about the distribution of features and phenomena shown on the maps. This stage is now in the full tide of progress and its completion lies in the indefinite future. The teacher who would himself receive and give to his students the best fruits of geographic study must not shrink from any portion of this task. It is not enough to learn where the Appalachian mountains are, their trend, length, breadth and height, but it is equally the business of geography to know how they came into existence and why they possess the peculiar characters which distinguish them from other mountains. It is not enough to describe the Mississippi river, its course, length, volume and tributaries, but the causes and conditions which make it what it is, must be attacked. It is not enough to know the names, locations, areas and connections of the Great Lakes, but how their basins came to be there must be explained. This is as essential to good geography as their relations to commerce. It is not enough to say that Chicago is a city of two million people near the head of Lake Michigan, but the question, what made it grow to such dimensions? must be answered. This principle must be applied to all geographic features alike. The causes of plains and plateaus, valleys and mountains, lakes and waterfalls are as much a part of scientific geography as the causes of night and day, winter and summer, winds and rains, waves and currents, farms and factories.

Geography is now entering upon a third stage of development which promises to carry the science on to a higher dignity and value. In the time at command I can only briefly and imperfectly indicate its character.

According to a theory once very popular, an omnipotent creator had, for his own amusement or glory, made out of nothing a mass of earth, water and air, whether round or flat was of trifling importance, had suspended it in space, had made sun, moon and stars to revolve around it at various distances and speeds to throw their shifting lights upon the mundane stage, had provided a vast array of scenery and properties, and had placed upon it a motley company of actors to play, each for one night only, the drama of life. Among these the bright consummate star was man, for whom the whole play, with all its leading and subordinate parts, supporters and supes, settings and costumes, was especially designed. In fact, man was the only real actor, the rest being little more than marionettes, wire-worked puppets, under the mechanical control of the stage manager. This theatrical statement is something of a caricature, but it serves to exaggerate and bring out one characteristic, that the relation between man and his surroundings, as well as between the various elements of the surroundings themselves, was conceived to be as purely mechanical as that between the actor and the stage setting. This theory, of course, assumed in different minds and times various degrees of childish crudity and philosophical refinement, but this one element of mechanical arrangement of parts, was never absent.

But since the days of Copernicus and Galileo our knowledge of the starry heavens has widened until we no longer think of the universe as made for man or man for the universe. We no longer think of the earth as merely a stage setting for the play of human life. The stage has not been arranged by the manager for the actors, but the actors have been fitted to the stage. They are what they are and no other, where they are and not elsewhere, and playing each his own peculiar part, because they have been molded, trained and adapted by means of that particular scene and part. The metaphor of the stage here breaks down and may be finally abandoned. Everything on earth, from a butte to a beetle, from a pebble to a pope, is in a large sense, the product of its environment. No one has put the case more clearly than Redway: "Indeed it would not be a very great breach of truth to say that a camel is a camel because of the desert; a fish, a fish because of the water; a bird, a bird because of the air;" and he might have added, a man, a man because of the world he lives in. The evolutionary interpretation of nature has wiped out of scientific minds the last vestige of the mechanical theory of the universe. It still lingers in some schools. The environment has not been adapted to man, but man has become partially, but still imperfectly adapted to his environment.

Professor Ratzel, acknowledged to be the greatest modern master of geography, does not hesitate to call the earth a vast workshop in which all living creatures, including man, have been constructed. "The predominant position which man occupies," he says, "is possible only on this earth and under these natural conditions, and therefore the earth has a far deeper significance in the history of mankind than it would have merely as the ground upon which men walk and labor and in which their graves are finally dug." Man appeared as the child of the earth and the earth mother has brought him up by means of a struggle with all her forces and creatures.

According to this view, the earth is not only the home of man, but the factory in which he has been made, the garden in which he has grown, the school in which he has been educated. The doctrine of evolution has laid its hand upon geography and is transforming it, as it has transformed every other subject of human study.

Environment is not responsible for the whole of anything, but for a part of everything, and nothing can be understood apart from the environment.

Hence the explorer and the map maker, with their completed description and schemes of distribution, have not attained an end but achieved a beginning, have laid a foundation upon which the true geographer may build his science of the relations of every feature and creature to its environment. Distribution, although still essential is ceasing to be the central idea of geography, and the light of the science is being focused upon environment.

The vast importance of physical environment is beginning to be appreciated and the whole scientific world is turning to physical geography for a solution of some of its greatest problems. We find the botanists of late paying a great deal of attention to ecology, which being interpreted, is the science of dwelling places. They find that certain groups of plants, which differ widely in every other respect, are in the habit of living together peacefully in localities of a certain character. For instance, the shallow water around the edge of a pond is filled with submerged plants like the water lily. A little higher where the ground is less deeply covered with water, other groups like cattails and reed grass, flourish. Outside of these in very damp soil is a thicket of willows and alders, and around this in soil a little more dry, grow trees like the elm and soft maple, while a dry sand ridge near by is covered with scrub oak. Evidently this ring-within-ring arrangement of vegetation is determined by the amount of water in the soil, that is by the physical environment of the plants. The zoologists are discovering that physical conditions exert a similar control over the distribution of animals, and so a new branch of science, geographical biology or biological geography, is coming into existence. The physicians have discovered that malarial fever and yellow fever are dependent for their propagation upon certain species of mosquitoes. No mosquitoes, no fever, and so the geographical distribution of mosquitoes has become a burning question in medicine, in commerce, and in politics. Malarial fever is the chief obstacle which has thus far prevented civilized men from colonizing and occupying the tropical regions. If malarial fever can be wiped out by destroying the mosquitoes, a large and extremely valuable portion of the earth will be thrown open to civilization and will support a dense population.

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However simple a thing may be, its environment is sure to be complex, and in dealing with the science of environment, subdivision and organization at once become necessary. The smooth round pebble on the beach is the product of the waves which roll it over and over against its neighbors a thousand times. A volcano may be said to be wholly the creature of its environment, of the internal forces which have acted beneath to build it up and of the air, frost and rain which are tearing it down. But the most complex, important and interesting results of environment will be found among plants, animals and men. Professor Davis has recently proposed to define geography as the relation between the earth and its living inhabitants, between the physical environment and the environed organism. That part of geography which deals with the physical environment and is familiar to us all under the name of physical *geography* he would call *physiography* and for that part which deals with the environed organism he proposes the name *ontography*, reserving the name geography for the grand combination of the two.

In the First Year Book of the National Society for the Scientific Study of Education, he elaborates this idea with a philosophic grasp of principles and great wealth of illustration. "Thus understood," he says, "geography involves the knowledge of two great classes of facts; first, all those facts of inorganic environment which enter into relationship with the earth's inhabitants; second, all those responses by which the inhabitants from the lowest to the highest, have adjusted themselves to the environment. Neither physiography nor ontography alone is geography proper, for geography involves the relation in which the elements of its two components stand to each other."

The relations involved in geography, as thus understood, are extremely numerous and varied and many of the large and more general relations have long formed familiar items in the geographical stock. The relation between the irregularity of coast lines and the civilization of peoples, the relations of population and industries to rugged sea-girt New England, to smooth fertile prairies, to the arid plateaus of the Great Plains, and to the deserts of the Great Basin are standard geographical problems. But there are innumerable smaller details of relationship which belong to geography. I have compiled partly from Professor Davis's article the following list:

The rotation of the earth producing day and night, controls short periods of activity and rest, while the revolution of the earth and the inclination of its axis, producing the seasons, control long periods.

The size and density of the earth determine the force of gravity, to which the strength and rigidity of plant stems and the skeleton and muscular system of most animals have become adjusted. Only fish and other aquatic animals buoyed up by the water, escape this condition and are constructed on a different plan.

The absorption of carbon dioxide by plants for food and the respiration of oxygen by plants and animals are responses to the omnipresence of air; as also are organs of hearing and voice. The upward growth of plant stems and the organs of sight in animals are responsive to certain portions of solar radiation.

Mountains are barriers to the migration of plants, animals and men, which men have overcome by following stream valleys up to passes, by tunnels, zigzags and switchbacks. Mountains are often inhabited by the sweepings of the plains, while difficulty of communication, sparseness and isolation, lead to lack of progress or degeneration, as well as to love of liberty, independence and freedom from social vices.

The contrasts between the inhabitants of an island in the ocean and those of the surrounding waters is obvious, but no greater than that between the inhabitants of a lake and those of the surrounding land. An isolated group of mountains, like the Black Hills, presents an almost equal contrast with the surrounding plains. These elevations bring rainfall, which brings forests: denudation exposes veins of ore, and forests and mines bring population.

All creatures must adapt themselves to the available food supply: therefore in the South Sea Islands men live upon cocoanuts, in Greenland upon blubber, in North Africa on dates, in Indiana on beef, pork and cereals.

The earth worm gets food from the humus of the soil, the deep sea fish from the organic matter in the bottom mud, the supply of which falls through miles of water from the plant life on the surface. Many birds live upon insects caught only on the wing in the air, some upon fish or submerged plants for which they dive. Bees are so specialized as to depend upon the nectar of flowers.

In the matter of shelter again physical environment controls. There are brush huts in the jungle, grass huts in the savannahs, dug-outs and sod houses on the prairies, log houses in the timber, skin tepees on the plains. In China people excavate houses out of loess bluffs, and here martins have holes in sand banks. Men and beasts use rocks, crevices, caves and overhanging ledges. The muskrat and beaver build houses in the pond; woodchucks, gophers and prairie dogs burrow almost anywhere. Squirrels and wood-peckers use dead or hollow trees. Wasps use mud, and birds an endless variety of material for their nests.

A land covered with ice and snow has made the Esquimaux good sledgers and kayakers, and a land covered with dense forest has made the natives of equatorial regions expert canoe-men, the rivers being the only passable roads. The location of roads between neighboring villages on a plain, or a ford, bridge or ferry, of railroads along stream valleys, of trestles and tunnels through mountains, of ship channels in harbors, paths beaten down by wild animals in a jungle, trails worn by cattle to watering places, the lanes followed by herds of pillaging ants, are all equally good examples of the control exerted by physical environment over living creatures.

The fleetness, endurance and venom of desert animals are in direct response to the hard conditions of life there. Cattle cannot live in certain parts of Africa on account of the tse-tse fly, and white men can hardly live there on account of the mosquitoes which transmit malarial fever.

These are a few, taken almost at random, of the endless variety of examples of the control which physical environment exerts over the structure, habits and lives of plants, animals and men, and of the response or reaction which the living creature has been obliged to make. In every case the creature has taken advantage of some condition of its physical environment, has become especially adapted to that, has survived and continued its race. Those who failed to respond effectually and to take advantage of some condition, have disappeared in the struggle for existence.

These relations are all geographical, and I like this kind of geography. It stands upon solid ground and may lift its head as high in the air as any one cares to build it.

If you asked me to come here to talk about, "What is Geography?" expecting me to give a simple, direct, and authoritative answer to the question, you have been disappointed. I hardly think that any man or body of men is in a position to do that at present. I can only say that geography has passed through a long period of development and the end is not yet. In the early stage it was a description of the earth. In the scientific stage which now prevails everywhere outside of some schools, it is "the exact and organized knowledge of the distribution of phenomena on the surface of the earth." In a third evolutionary stage which is just beginning it is, "the relation between the physical environment and the environed organism, between the earth and its inhabitants." This third and perhaps final stage of geography is based "not upon the old doctrine of the adaptation of the earth to man, but upon the modern evolutionary principle of the adaptation of all the earth's inhabitants to the earth," and the definition of the future may come to run something like this:

Geography is the science which deals with the distribution of every feature and the environment of every creature on the face of the earth.

Like every other science, geography is dependent upon its sister sciences, as they are dependent upon it. At every turn it calls upon physics and chemistry, for they alone can tell of the intimate properties of the matter with which it deals. Biology is equally dependent upon them, for they are the substrata of all natural science. The relations between geography and astronomy are intimate because the earth is one of the heavenly bodies and has relations with the rest. Their relations have always been peaceable and coöperative. Some portions of pure astronomy, such as the names, sizes, distances and motions of other planets, have occasionally strayed into geography, but they are disappearing. Confusion here is absurd. That the sun emits radiant energy is a fact of astronomy; that the energy is distributed over the earth in the form of heat and light is a fact of geography.

The largest overlap lies on the side of the other earth-science, geology. A wide domain of phenomena belongs to both sciences equally; but the spirit and purpose of the two are different. The aim of geology is to determine the life-history of the earth—the method of its creation in time—of geography to determine the present distribution and relation of earth features in space. "One reads the past in the light of the present, the other reads the present in the light of the past." The geologist is absolutely dependent upon geography for a knowledge of present features and processes, by which alone he is able to read the past history of the earth. The geographer cannot understand present features without knowing something of their history. The field of the geographer is the face of the earth, but he does not hesitate to go inward to the center, or outward to the remotest star, if he can find anything there which will help him to understand geographic features. Geology and geography are twin sisters which vie each with the other in offices of mutual help.

Geography and biology have similar relations. When the biologist studies the relations of plants and animals to soil, water, air, and climate, he is studying the geographical side of biology, and when the geographer studies the distribution of plants and animals, he is studying the biological side of geography. There is no occasion for contention or quarrel over boundaries which do not exist, but opportunity for friendly rivalry in a contest as to which can help the other most. And so it is with the relations between the geographer and the anthropologist, historian, political economist, statesman. Everything knowable has an environment and consequently a geographical phase. Human knowledge is not divided into a certain number of thought-tight compartments. As knowledge increases old dividing lines shift and fade or break down altogether and permit their contents to coalesce like two drops of water.

As Mr. Mackinder suggests, the different sciences are only different standpoints "from which to view, to analyze, and to group the facts of existence." A tree, a house, a mountain, a landscape, presents a very different appearance from different standpoints. Some features and relations are best seen from one standpoint, some from another. The most complete knowledge is gained by observation from all possible standpoints. All the sciences in existence and the many more which are sure to come, are but so many different standpoints.

EDITORIAL

THE UNITED STATES TOPOGRAPHIC MAPS

ATTENTION is particularly called to the announcement in this number of the increase in the wholesale price of the United States Geological Survey Topographic Maps. These maps are so necessary a part of every high school, normal school and college equipment in physical geography that wider and more conspicuous notice should have been given of a change in policy affecting educational geography so materially.

The topographic map of the home locality should be familiar to every child living in a region which has been mapped. It should be in every home in the locality as the best local reference map and a copy should be hung in every school room. These maps deserve wider use in the lower schools as reference maps and as classroom maps for careful study. The maps are easily understood, if carefully studied, and are not beyond the powers of sixth grade pupils, if properly presented.

Yet many teachers are ignorant that such maps exist and approach the study of them with trembling and fear.

Any map is to many people worse than a Chinese puzzle, and topographic maps are to them impossible. This is not as it should be and our elementary schools should make the use of these maps familiar to all. If one of the purposes of school work is to make a better living possible, then training should be given in those things that make the home locality a better living place. Certainly every one ought to know the geography of his home locality and how to use that locality as a basis with which to compare other localities. The topographic maps can and should be used for these purposes. The United States Government is making some of the best, cheapest and most usable as well as valuable maps in the world. These maps should be taught to every child possible that the next generation may be trained in how to make use of available and cheap and accurate reference materials. Hence the use of the local topographic map should be taught to every child possible that he may know of its existence, know how to use it, where to get it and become so familiar with it that he cannot get along without it.

RECENT PUBLICATIONS

A LABORATORY MANUAL IN PHYSICAL GEOGRAPHY. By Frank W. Darling. Atkinson, Mentzer & Grover, Chicago and Boston, 1905.

A revised and supplemented edition of the author's former manual, prepared for use in the Chicago High Schools. Arranged in note book form with maps, note paper and section paper. Practical and devoted to exercises in physical geography —to be said of few other laboratory guides. To be reviewed later.

COMMERCIAL GEOGRAPHY. By Henry Gannett, Carl L. Garrison and Edwin J. Houston, pp. 415. American Book Company, New York, 1905.

A "text-book" to be "learned" more than to be studied. Gives more attention to financial and social side of commerce than is customary in text-books. This, together with the diagrams and most excellent index are strongly to be commended. To be reviewed later.

YEAR BOOK OF THE DEPARTMENT OF AGRICULTURE, 1905. Government Printing Office, Washington, D. C.

A source of much geographic information of value to teachers. The following articles may be noted in the current volume:—Relation of Weather Conditions to Growth and Development of Cotton; Agricultural Development in Argentina; The Castor Oil Industry; The Weather Bureau and the Home Seeker; Cotton Culture in Guatemala.

CURRENT EVENTS

SEEKING THE NORTH POLE

It is in the American character to admire courage, persistency, and patriotism even when their practical results are not adequate. In the attempts of American explorers to reach that particular point in the Arctic regions farthest distant from the Equator, it is admitted that the successful accomplishment of this ambition would not now aid commerce, would not materially increase our knowledge of geography, and would yield probably but meager scientific data. But every one sympathizes with Commander Peary as he once more enthusiastically takes up his chosen task of trying to place the American flag further north than that of any other nation. Certainly no one could possibly deserve success more than does Commander Peary, who has spent a large part of his active life in planning feasible ways of attacking the problem, and has endured all that man can endure and live in his repeated efforts to carry those plans out. He now has for his seventh expedition a fine new ship, the Roosevelt, built for the express purpose and with all the special forms of construction which experience has shown valuable in fighting ice. He will take on board of the Roosevelt when he reaches high latitudes a company of Eskimos specially chosen and well known to him, and with them and his crew of about twenty will sail as far north as he can get along the shore of Grant Land. Here his ship will probably be frozen in about the middle of September, perhaps 450 or 500 miles from the Pole, and he will spend the greater part of the Arctic winter in preparing for his final dash north. His point of departure he expects to be somewhere about latitude 83°, and when the twilight of February makes traveling possible he will start thence with a very small company and move rapidly forward (ten miles a day is rapid traveling in that region), until the five hundred miles or so to the North Pole have been traversed or failure and return became inevitable. This plan is as simple as it can be made, and Mr. Peary builds his hopes of success on the strength of his ship and his knowledge of the Eskimos and of sledge work. Thus he declares that he knows the very men among the Eskimos who will follow him as far as he will go, and he knows equally those who will quail in the face of disaster. The party will have from twenty to twenty-five sledges, drawn each by six or eight dogs; each sledge will carry about five hundred pounds, including the weight of the driver. Mr. Peary says that he will depend for food almost entirely upon pemmican, ship's biscuit and tea, and that experience has shown these to be far the most effective articles of food and stimulus. It is said that no less than four thousand lives, two hundred ships, and $100,000,000 have been expended in the efforts to reach the North Pole. It is fair to admit that in the past at least valuable geographical and other scientific knowledge has been added in this way, directly or indirectly, to the world's store of information. This year there will be four expeditions in the Arctic regions. Two of them are of American origin, one French, and one Norwegian. Mr. Peary's expedition is the only one of these which starts from Greenland, and the general impression among students of Arctic exploration is that he has a better chance of success than his competitors. It will be remembered that the present record of "highest north" belongs to the Duke of Abruzzi's party, which in 1900, under Captain Cagni, planted the Italian flag at the latitude of 86° 33′—an advance of only a score or so of miles beyond Nansen's attainment.

THE NORWEGIAN SITUATION.

The conditions demanded by Sweden from Norway as a condition of recognition are now under consideration. The new nation is still in search of a king. King Oscar's refusal to permit any Bernadotte prince to accept the office is certain to be respected, and Norway turns naturally enough to Denmark. The alleged offer of Emperor William to select a monarch for the Norwegians from the ranks of German princes is not likely to be seriously considered, for Norway could do nothing more suicidal than to put herself in Germany's power by such an alliance.—*The World To-day, Sept.*, 1905.

THE SEMI-CENTENNIAL OF THE "SOO"

An occasion of noteworthy historic interest was the celebration on August 2 and 3 of the fiftieth anniversary of the opening of the St. Mary's ship canal at Sault Ste. Marie, Michigan. Many state officials, congressmen and federal officials of the United States and Canadian governments were present for this celebration. Vice-President Fairbanks in his address called attention to the fact that the enormous shipping which passes through the Soo Canal each year is almost wholly American. He contrasted this situation with that which exists on the Atlantic Ocean, where American ships are so rare as to excite attention. The commerce of the Sault Ste. Marie Canal has grown rapidly since the development of the iron and copper mines of the Lake Superior region and the perfection of ore-carrying boats and ore-handling machinery. When the canal was constructed fifty years ago the most optimistic observers could hardly have foreseen the astonishing development of lake commerce which has taken place during the last twenty-five years.—*The World To-Day, Sept.,* 1905.

THE YELLOW FEVER IN NEW ORLEANS

The yellow fever epidemic at New Orleans has assumed alarming aspects, owing to the rapid spread of the disease in new localities. Each day cases are reported from districts hitherto exempt and new centers of infection are thus created. The total number of cases to date is over six hundred and the deaths about one-fifth of the cases reported. Most prominent among these victims is Archbishop Chapelle, who had returned to New Orleans to assist in fighting the fever. The city and state authorities having requested the assistance of the federal government, the situation is now in charge of the surgeon-general. Strict quarantine measures have been adopted to prevent the spread of the disease to adjoining states. It is notewothy that, although the mosquito theory of the origin of yellow fever has been very generally rejected in New Orleans up to the present time, the present fight against the epidemic is based wholly on that theory. If the multiplication of the mosquito can be arrested by oiling the cisterns and other reservoirs, and if the insect can be kept from contact with yellow-fever patients, according to this hypothesis, no new cases can arise.—*The World To-Day, Sept.,* 1905.

THE CAPITAL OF ALASKA

The capital of Alaska has recently been changed from the historic town of Sitka to the thriving mining city Juneau.

NOTES

CHANGE IN WHOLESALE PRICE OF TOPOGRAPHIC MAPS.—On and after July 1, 1905, the *wholesale rate* on all topographic maps *will be advanced one-half;* that is, the price of the standard or small size sheet will be increased from $2.00 to $3.00 per hundred, and the price of the large maps will be increased proportionately. The discount will be 40 per cent. of the retail price when 100 or more standard topographic atlas sheets, or their equivalent in other maps, are ordered. In no case can orders be filled at the wholesale rate unless the sum remitted solely for topographic maps amounts to at least $3.00. No change will be made in the retail rate.

No order received after June 30, 1905, will be filled at the old rate, no matter when dated or when mailed.

A wholesale rate immediately effective has been established for topographic and geologic folios, whenever the sum transmitted solely for folios at the wholesale price amounts to *at least* $5.10; that is, a discount of 40 per cent. will be given whenever 34 or more folios that sell singly for 25 cents, or their equivalent in higher priced folios, are ordered at one time.

Attention is called to the fact that folios and topographic maps *can not be combined* in a single order at *wholesale rates unless the sum remitted for each is at least the minimum* stated above.

Prepayment is required, and may be made by money order payable to the order of the Director of the United States Geological Survey, or in cash—the exact amount. Checks and postage stamps can not be accepted.

All correspondence should be addressed to

THE DIRECTOR,
United States Geological Survey,
Washington, D. C.

ERRATA.—In the article "Practical Exercises to explain the Topographic Map" in the May-June issue of this magazine, the following typographical errors should be corrected:

1. In the text:
    - Page 223, last line, read: Pl. I, I*b*, I*c*, for: Pl. I, I*B*, I*C*.
    - 224, first " read: Pl. I, I*a*; Pl. III*C*, for: Pl. I, I*A*; Pl. III, II.
    - 224, fourth " read: *outlines*, for: *lines*.
    - 224, 32d " read: I*a*, *b*, *c*, for: I*A*, *B*, *C*.
    - 224, 33d " read: II*a*, *b*, *c*, for: II*A*, *B*, *C*.
    - 225, 5th " read: *III*, for: *d*.
    - 225, 12th " read: *III*, for: *BI*.
    - 225, 14th " read: *II*, for: *BII*.
2. On the plates:

   The numbering of the illustrations was to have been as follows:

- Plate I.
  - A. Topographic map. *(Not: IA.)*
  - B. 100 Ft. Contours, colored. *(Not: IB.)*
  - C. 100 Ft. Contours, uncolored. *(Not: IC.)*
  - D. Sections:
    - Ia. Longitudinal section:
      - Horizontal scale, 1 inch=1 mile.
      - Vertical scale, 10 inches=1 mile, (1 inch=25 contours).
    - Ib. Cross section, same scales.
    - Ic. Second cross section, same scales.
- Plate II.
    - IIa. Part of section Ia, in natural proportions.
      - Horizontal and vertical scales, 10 inches=1 mile.
    - IIb. Part of transverse section Ib, in natural proportions, same scales.
    - IIc. Part of transverse section Ic, in natural proportions, same scales.
    - III. Profile Ia, in natural proportions. *(Not: IId.)*
      - Horizontal and vertical scales, 5 inches=1 mile.
  - E. Cardboard contour model. (Contour relief map.) *(Not: IIe.)*
- Plate III.
  - A. Topographic map. *(Not: IIIA.)*
  - B. Contour line relief. *(Not: IIIB.)*
  - C. Sections:
    - Ia. Longitudinal section, horizontal: vertical scale=1:10.
    - Ib. Cross sections, same scales (looking south).
    - II. Part of section Ia, natural proportions.
      - Both scales, 5 inches=1 mile.
    - III. Same. Horizontal scale=1:10, vertical scale=1:5.
    - IV. Same, in contour line relief.
- Plate IV.
  - A. Topographic map. *(Not: IVA.)*,
  - B. Sections:
    - I. Horizontal, 1 inch=1 mile; vertical, 10 inches=1 mile.
    - II. Horizontal, 1 inch=1 mile; vertical, 5 inches=1 mile. *(Not:IVB.)*
    - III. Part of same, from x to z, natural proportions.
      - Horizontal and vertical, 5 inches=1 mile. *(Not: IVB.)*
  - C. Contour line relief. *(Not: IVC.)*
  - D. Sectional view of contour line relief. *(Not: IVCIV.)*

THE NEW PROVINCES OF CANADA:—The four territorial districts of Alberta, Athabaska, Saskatchewan and Assiniboia have recently given way to new provinces, Alberta and Saskatchewan. The eastern boundary of Saskatchewan is the western boundary of Manitoba extending northward. The western boundary is the 110th meridian. The region lying between this meridian and the western boundary of British Columbia is the province of Alberta. The northern boundary of the provinces is the 60th parallel.

THE MOON AND THE WEATHER.—The moon was for a long time widely held, and deep in popular belief, as the great weather breeder and prognosticator. But in recent years the lunar idea of weather control has been largely discarded. This belief could hardly be considered more than a mere superstition, as it is impossible to see from an astronomical analysis how the varying positions of the lunar cusps could in any way be connected with the character of weather.

The moon's appearance to us depends on the relative position of the moon and sun in regard to the observer's horizon. From new to full, the moon gradually increases from a crescent to a full circle, and back again from full to new. The positions of the crescent vary, as the moon (shining by the light of the sun which she reflects to us) is sometimes north of the sun's path and sometimes south of it. The variation is probably noticed most in the new moon which is seen when the sun is just below the horizon. A line joining the horns of a new moon is sometimes nearly vertical, and oftentimes nearly horizontal. These were supposed to foretell the weather, the first being called "wet moon" and the second "dry moon."

Even if the several lunar phases did influence our atmosphere, the same phase should produce the same effect all around the world (as the earth revolves on its axis in twenty-four hours) for any given latitude circle. It is true that the ocean tides are for a large part the result of the moon's attraction, but this force when applied to the earth's atmosphere, is wholly insufficient to produce any appreciable disturbance in the atmosphere. It is most probable that the moon belief grew up out of the naturally frequent coincidence between certain weather changes (and certain brands of weather) and selected moon phases. The moon enters a new phase, or quarter, every seventh day, and the weather (at least in the middle latitudes) changes on the average of one to two times in seven days; hence there must be a great many accidental coincidences. And if one counts the agreements and overlooks the disagreements, quite a theory could be announced. The lunar phase theory was not found to bear the test of accurate comparison of weather observations with the lunar phases, except in this very slight and imperfect manner, which is entirely insufficient to have any value in weather prediction. Nevertheless, the moon and her changing phases have been the basis of nearly all the weather forecasts found in the almanacs. And the almanac has probably received more wide distribution, and has been more greatly cherished by the people of all countries, than any other publication, next to the Bible.

Nearly all countries have had their almanacs, but they were particularly popular in Germany and England. In America, probably, the almanac which has been more widely read and its weather forecasts more generally credited than any other, is the Hagerstown Almanac, which has been published regularly every year since 1794. Yet the weather predictions appearing in it were based entirely upon the time of day the moon entered into any one of her four quarters. For instance, if this happened between midnight and 2 A. M. it indicated fair weather in summer, and fair with hard frost in winter, unless the wind be south or southwest. While, on the other hand, if this change occurred between noon and 2 P. M., it indicated very rainy weather in summer, and rain or snow in winter. And so a table claimed to be constructed on a due consideration of the attraction of the sun and moon in their several positions respecting the earth, was prepared for all the hours, and thus was weather forecasting simplified and made easy.

The full moon has usually been associated with clear, cold weather. This is probably because we notice the full moon so much more when the weather is clear, and also clear nights are cooler on account of the more rapid radiation of the earth's heat than when blanketed with clouds. Also since the moon's path on the heavens is so near the ecliptic, and full moons are always 180 degrees from the sun, they are far north in winter, and thus longer above the horizon in the northern hemisphere than they are in summer, and thus we associate full moons with our long, cold, winter nights.

So much for the moon as a weather forecaster.—From *Fake Weather Forecasts, Popular Science Monthly, October,* 1905.

Dr. Cleveland Abbe, Jr., U. S. Geological Survey, Washington, D. C., is the American Collaborator for the Annual Biblioteca Geographica of the Berlin Geographical Society. Dr. Abbe would deem it a favor if authors would send separates to him at the above address, or at least full titles, pages, illustrations and references.

THE JOURNAL OF GEOGRAPHY

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A NEW METHOD OF REPRESENTING THE EARTH'S SURFACE

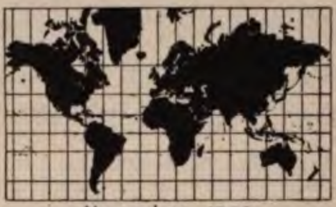
BY J. PAUL GOODE
Assistant Professor of Geography, University of Chicago, Chicago, Ill.

THE VAN DER GRINTEN PROJECTION:

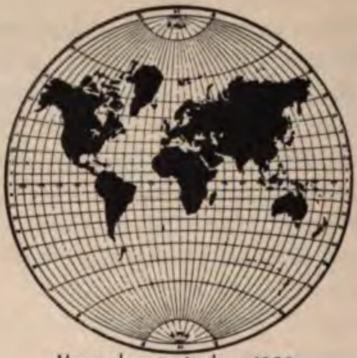
IT is quite impossible to represent upon a plane any considerable portion of the earth's surface, without introducing a train of errors of distortion. The difficulties rise to a maximum when it is required to show the whole earth's surface at once. The problem is solved in many ways, with various degrees of satisfaction, but always if the truth be told in one respect it is grossly violated in some other. If directions are represented by right lines, then shapes and distances are sacrificed. If areas are true, then shapes and the relation of the lines of reference are violently misrepresented. So of the many projections, we choose one which is true along the line of the most conspicuous need in our presentation and shut our eyes to errors on other lines. For the mere satisfaction of having the habitable part of the earth's surface shown at a glance, and at the same time have parallels and meridians shown as straight lines, the so-called cylindrical projection of Mercator (1569), or some easy modification of it is most commonly used. In charting world-like distributions, as ocean currents, atmospheric temperatures, pressures and the winds, all of which emphasize latitude most conspicuously, this projection has a strong point. But always in the enormous exaggeration of arctic lands, or of the east-and-west distances in high latitudes. The constant use of the Mercator projection tends to teach this untruth of form and area, so that we of North America come to have some excuse for a sort of geographic "big head," as the common phrase runs, and I suspect that nine out of ten of us would answer off hand, that North America is a great deal larger than Africa.

So, to guard against this common danger of exaggeration, Mollweide, in

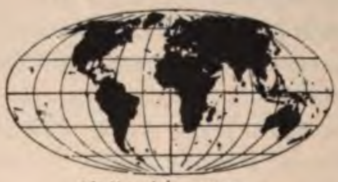
1805 invented a method of projection which throws the earth's surface into an ellipse, having the length of a meridian for its minor axis, and the circumference of the equator as its major axis. The central meridian in this case is a right line, all other meridians being elliptical. The equator and all the other latitudes are represented by straight lines and parallel. Such a projection retains the advantage of having the parallels as right lines, and has a very great advantage in having equivalent areas, that is, a square mile occupies as much space in one part of this map as in any other. But shapes are grossly distorted in all the margins. Nevertheless, this projection is much used in German cartography, and with good reason.



Mercator 1569

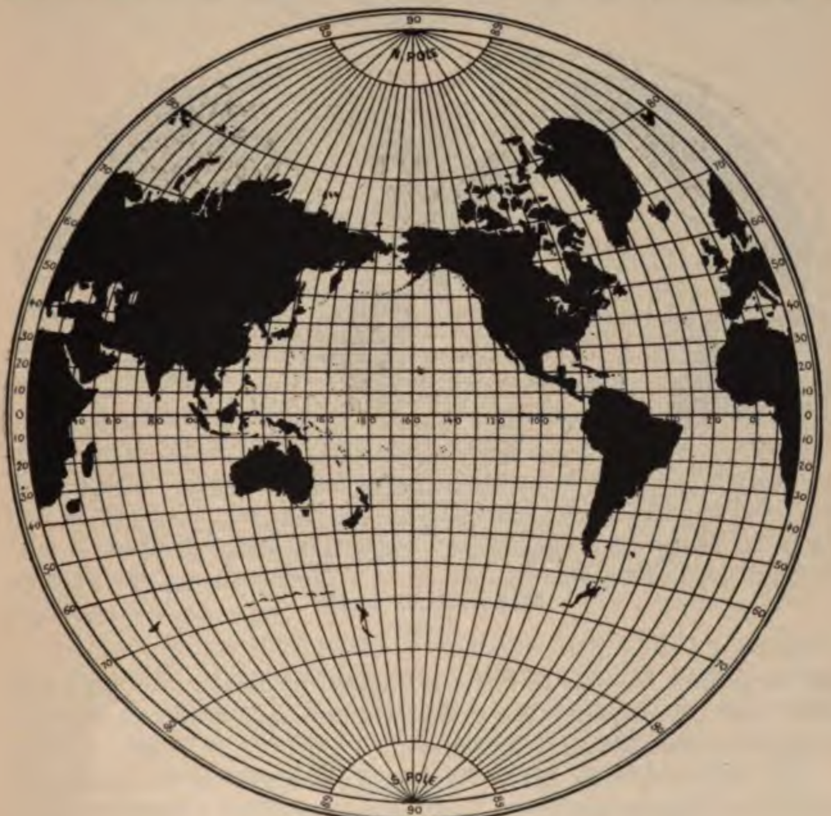


Van der Grinten 1898



Mollweide 1805

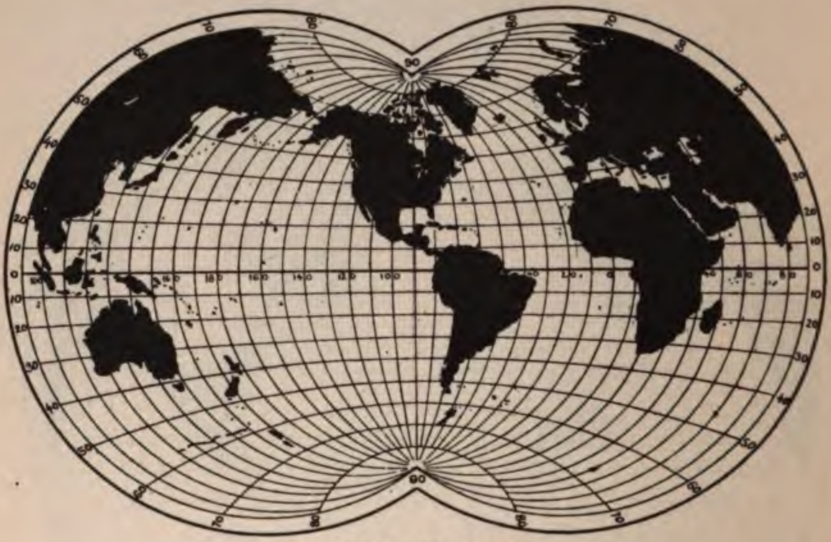
Mollweide's invention was made a hundred years ago, and interest in map projection seems to have lapsed. But just before the century's end, Mr. Alphons van der Grinten, a resident of Chicago, brought out a new projection, which is truly, as Prof. Dr. E. Hammer says of it, "a lucky stroke." For in this projection, Mr. van der Grinten strikes a happy mean between the extremes of Mercator and Mollweide by representing on one circle the entire earth's surface, in such a way as to reduce to a minimum the angular distortion of Mollweïde, and at the same time to reduce at a proportional rate the distortion of areas and distances so prominent in the Mercator projection. The scheme of projection is strictly geometrical, both parallels and meridians being represented by arcs of circles. The marginal meridian is a circle, and there is no distortion along the equator. The area of the circle occupied by the map is equal to the surface of a globe of one-half of the diameter of this circle.



PACIFIC VIEW

It is to be noticed in this method, that all errors in projection are at a minimum at the equator and at a maximum at the poles, so that the continents fall within the zone of least alteration. And this suits our convenience, for our chief and most constant interests are in the lower latitudes, and for the most of our uses latitudes above 75 degrees could be ignored.

Of course any meridian may be chosen as the center of the map, and so any region may acquire the maximum advantage which the middle portion of the map gives. In Fig. 1 this advantage is gained for Europe, Africa and the Atlantic Ocean. In Fig. 2 it is gained for the Pacific Ocean, and in this view it is surprising how remarkably true space relations are shown for the Pacific and all contiguous lands.



AMERICAN VIEW

$b=\frac{1}{2}$

Mr. van der Grinten has worked out a modification of this scheme of projection, in which the central meridian, instead of being equal in length to the equator, is only one-half as long. This gives an outline like the figure 8, and increases the accuracy of representation for the half of the earth's surface occupying the middle of the map. This method of projection very materially reduces the area of the page occupied by the map, and so has an additional advantage. When the meridian of 90°W. is chosen for the center, it gives us the best results of any of the projections heretofore used, for the display of the entire new world and the contiguous oceans

(Fig. 3). And if the meridian of 90° E. be chosen, it will give an equal advantage to the eastern continent. In this modified form the projection gives a much greater marginal distortion in high latitudes. But this is largely compensated for by the increase of accuracy in the 200° of longitude in the middle of the map, and in all longitudes in low latitudes.

These new projections have very high value. They have received the heartiest approval on the part of the leading German geographers, and have been published in the foreign magazines of highest authority. They should win their way into a secure niche in everyday use.

A MODEL SERIES OF BASE MAPS

BY J. PAUL GOODE

Assistant Professor of Geography, University of Chicago, Chicago, Ill.

WITH every active teacher and growing student the need is constantly rising for a base map for the entry of facts of distribution of one kind or another. Multitudes of these facts meet us all along the way. It may be the delineation of routes of commerce, or the movement of populations, the territorial expansion of governments, or productive areas in commercial geography. In all lines from common school geography and history, through civics, physiography, meteorology, commercial geography, politics and sociology, these needs confront us. For a map is a kind of shorthand, and expresses far more rapidly, and accurately too, the facts of distribution, than a long and tedious detailed description could do. And the map appeals to the eye, so adding another sense to the avenues of acquisition of knowledge.

But when we look about us to find blank maps upon which we may chart these data, they are not to be had, or are hard to find. It is true, a dozen publishers in this country issue series of outline maps intended for such a purpose. But to mention any one of them is to condemn it. As a rule they are atrociously drawn, they are printed with poor ink on inferior paper, and if our seventh grade pupils had been adequately taught they would be insulted to have such stuff put before them. The paper is thin and open, it takes neither water color, ink, crayon or pencil adequately, and the pupil's work when entered, is a smutch and a disgrace.

For a number of years the writer of this paper has been looking for a respectable series of base maps. They have not yet been found in the small size required for student note-book work. It has even been necessary to have some made to order to get decent paper and respectable drawing.

So it was with real pleasure, that a year ago Madden's "Thermo-Geographical Studies" brought to my notice a very beautiful base map upon which the author had charted some climatic data. The map was the northern polar cap down to latitude 30° N. in a polar projection, yet with the distortion admirably distributed. It was drawn with great accuracy, and meridians and parallels for each degree were shown. Lands were tinted a light buff, the seas were untinted. Drainage lines, mountain axes, and important cities were shown, but not political boundaries. The map was the first of a series, constructed by Lieut-Col. Axel Staggemeier of Copenhagen.

The series was sent for at once, and was promptly forwarded to me by Col. Otto Staggemeier, Kong George Vej. No. 12, Copenhagen. It proves to be an ideal set of base maps, and many another student may be glad to know about them.

The set consists of twenty-five sheets, 22x21 inches, on a fine quality of plate paper. The maps are lithographed and the workmanship is excellent. There is a line for every degree of latitude and longitude, every fifth one slightly emphasized. All the letter press is in English, in engraver's Roman.

The first five sheets cover the earth's surface, as general maps. First the north polar projection, down to latitude 30° N. (No. 1). This covers one-quarter of the earth's surface and is so free from distortion that one is glad to know the method of projection. The equator is the plane of projection (A. B.) and the point of sight is in the earth's axis, produced beyond the south pole far enough to make the equator subtend an angle of 60°. This, obviously, makes all meridians straight lines, and all parallels circles, and distributes the errors of projection as shown upon the equator in the accompanying figure.

One can see at a glance the very great advantage such a projection has as a base map. One may take out any section of it, balance it upon its middle meridian, and have it erect and well poised upon his page. And we all know the lop-sided appearance made by taking out any part of a map on the usual projections, unless it be the one strip along the central meridian.

The next three charts cover 120° longitude each on Mercator's projection, representing that one-half of the earth's surface lying between the parallels of 30° N. and S. The points of view are so chosen as to give an Atlantic face (No. 2), a Pacific face (No. 3) and an Indian face (No. 4). Chart 5 finishes the general set, with a south polar projection down to latitude 30° S.

The remaining twenty sheets cover the earth on double the scale, giving us four sheets for the north polar quarter of the earth's surface, divided on longitudes 60° E.-30° W. (No. 6); 30° W.-120° W. (No. 7); 120° W.-150° E. (No. 8); 150° E.-60° E. (No. 9). Then the middle zone of lower latitude is covered in Mercator's projection, in twelve sheets, running from the equator to latitude 45° N. and S., as follows: N. 20° E.-40° W. (No. 10); S. 20° E.-40° W. (No. 11); N. 40° W.-100° W. (No. 12);

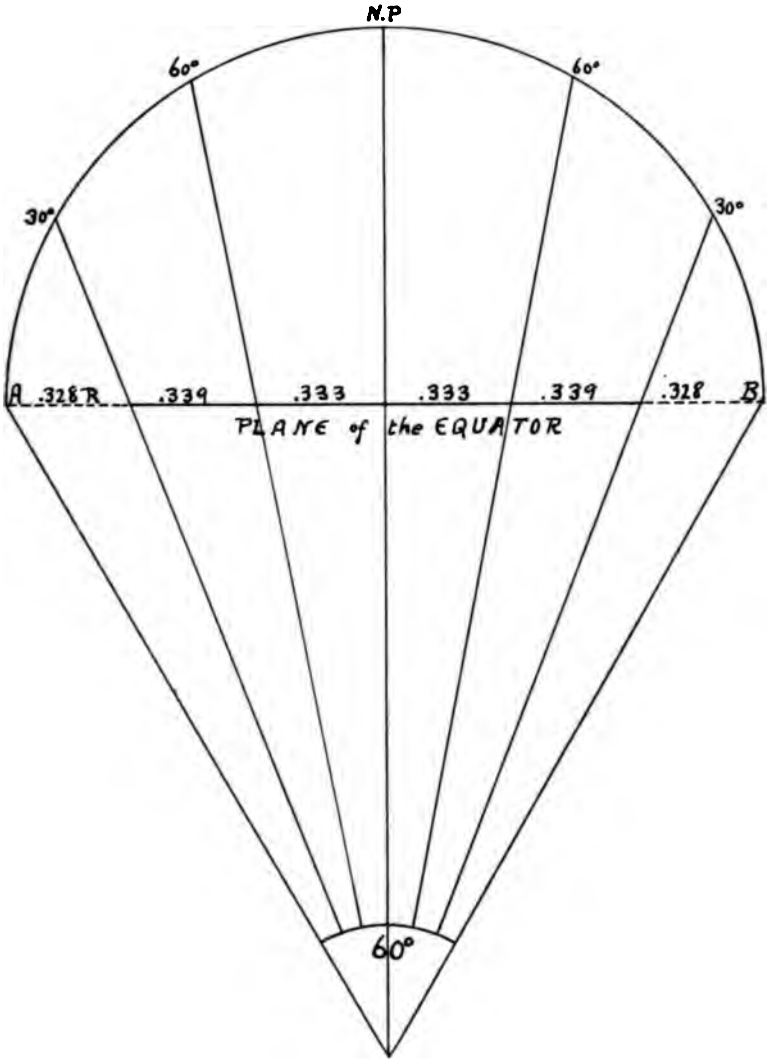


Figure showing the method of projection of the polar caps

S. 40° W.-100° W. (No. 13); these four forming the Atlantic face. The next four:—N. 100° W.-160° W. (No. 14); S. 100° W.-160° W. (No. 15); N. 160° W.-140° E. (No. 16); S. 160° W.-140° E. (No. 17); give us the Pacific face. The middle zone is finished with another four:—N. 140° E.-80° E. (No. 18); S. 140° E.-80° E. (No. 19); N. 80° E.-20° E. (No. 20); S. 80° E.-20° E. (No. 21); as the Indian face. The final four give the quadrants of the southern cap, latitude above 30°; 60° E.-30° W. (No. 22); 30° W.-120° W. (No. 23); 120° W.-150° E. (No. 24); 150° E.-60° E. (No. 25).

It is indeed a satisfaction to know that somewhere upon the planet, strictly high class base maps are made, even if we do have to go to the bother of sending to a foreign country with its difference in money, and perhaps with a barbarous tariff added as a fine upon the spread of intelligence.

But it would not be fair, in praising this set of maps not to call attention to some most excellent base maps of the United States, which are available for the use of teachers and students. These are copper engraved, and printed from stone, very accurate and very beautiful. They are another example of the almost incredible generosity of our government, when it sets its hand to a line of educational development. The maps referred to are in a series of general maps published by the United States Geological Survey, address The Director U. S. G. S., Washington.

(1) Base map of the U. S. one sheet, 11x16 inches, 204 miles to an inch, polyconic projection. All water entered in blue. Rivers and lakes shown in considerable detail. State boundaries, and names, and names of some rivers and cities in black. On a fine quality of plate paper, which will take any medium from pencil to ink. These maps are sold at five cents each, or at two cents when taken in lots of a hundred or over. And of course carriage is free, for they are sent by mail, at the government's expense.

(2) Base map of the U. S. one sheet, 18x28, 111 miles to an inch, polyconic projection. Rivers, a very generous number, entered in blue. Seas and lakes in green. Land untinted. Culture data—boundaries, cities, names, in black. These maps are large enough for use in class demonstration. Distribution may be entered in ink, watercolor or crayon. They are sold at ten cents each, or for one hundred or more, at four cents. This same map can be had with contours at the same price, or it may be had tinted in brown to show relief, at the same price.

(3) Base map of U. S., 49x76 inches, in three sheets, scale 40 miles to the inch, polyconic projection, all water in blue, culture in black. State and county boundaries, county seats and many cities given, latitudes and longi-

tudes represented by a line for each degree. A very accurate and a very valuable map. It is sold for sixty cents, singly, or at twenty-four cents in lots of a hundred. This map with railways, and contours of 100, 500, 1,000, 1,500, 2,000 feet and upward in thousand foot intervals, may be had at the same price. There could scarcely be a better map for school and general use.

It is very encouraging to have such fine maps available at such a generous price. The 11x16 map really comes within the possibility of individual use in class work, and the 18x20 map is ideal for the teacher's use in class demonstration, and is easily within the limits of his purse. But this is the end of the list. There is nothing else first class on the market in America. The regulation map on sale for the purpose is so bad, one would believe it if it bore the press mark of the "Gully Sunbeam." To put such stuff before an eighth grade student properly trained in graphic expression would be like giving a wood carver in the Pullman shops a plank from the sidewalk and a pick ax to work with. A base map for student use should be done in the highest quality of the draughtsman's skill, and of the pressman's art. It ought to be *right,* and in quality beyond anything the pupil may hope to do. By no means should it stand in the way of his best expression. It ought to be an example and a stimulus to him, to do his best in working with it. When shall we ever have such a series?

DIRECTION ON MAPS

Any teacher, no matter how untrained she may be in the use of map projections, ought at least to know that straight lines drawn from the right side to the left side of a map are not necessarily east and west lines. She should realize that the continuous black lines extending more or less across the map are east and west lines and that the similar lines extending up and down are north and south lines. Hence direction may easily be studied within the small irregular rectangles enclosed by two meridians and two parallels. These points need to be kept clearly in mind especially in wall-map work by pupils. Such problems as the direction and flow of the Yukon River or the St. Lawrence River ought to be studied as related to the meridians and parallels and not according to the sides of the maps merely, as is usually done.

Any teacher ought also to know that on a Mercator map areas in high latitudes are grossly exaggerated and that a Mercator map should not be used for comparison of areas. Neither should it be used for comparison of distances, though it is accurate in reference to direction. A teacher who studied distance according to scale would soon find that a Mercator map could not be used in this way because no scale would be found.

WHAT THE CIVILIAN MAY SEE OF GIBRALTAR TO-DAY

BY FELIX J. KOCH,

Cincinnati, O.

THE recent flirtations between the Powers and the Sultan of Morocco, coupled with the German Emperor's stop at Gibraltar and Tangiers, and the renewed rumors that the great fortress, guarding the entry to the Mediterranean is not nearly so strong as has been supposed, is turning the eyes of the world once again to Gibraltar. Gibraltar the fortress has been pictured times out of number, but it is a secret, known to comparatively few persons, that nestling within the shelter of the rock, lies one of the most cosmopolitan and picturesque cities of the world. Only certain liners pass Gibraltar in the daytime, and still fewer stop at the Rock; while the most of the tourists aboard the latter are, at such times, content with visiting the fortifications alone, so that Gibraltar city remains unknown.

A day in the neighborhood of 30° 59′ N. Lat. and 5° 34′ W. Long., as naval men speak of the Rock, is one of the interesting reminiscences of a Levantine tour. After almost nine days away from New York, in which 3,200 odd knots of sea have been traversed, passengers from the States awake to a cloudy sky and a gray-blue sea, scattered with innumerable sailboats. They have been told that this day they should see the Rock, and many an innocent is eager to catch first sight of the sign he has been led to believe is painted upon its side. Nine persons out of every ten expect to see a narrow peak alone, and those who look for more, anticipate a rock-formation that is black throughout.

About ten dim land forms appear on either side, marking the coasts of Morocco and Spain, and bringing forth the spy-glasses and cameras. Gradually these shores grow to mountains, just a trifle darker than the clouds above, bending off in low foot-hills, with wide yellow beaches below; and one great, blue-black range behind, the palm-trees, clear-cut against the sky on the crest of its highest summits. The nearer African shore runs gently back into mists which here enshroud everything, tingling the cheeks of the voyager and rippling the sea into white caps. The Spanish side, too, grows low, resembling some huge crocodile basking in the water,—with smooth, yellow areas along the base of its hills, and a lazy Spanish gunboat patrolling the coast beyond a small, white lighthouse. Patches of grain high up their slopes, divided by faintly-marked hedges, so closely resemble desert wastes as to recall at once "Gibraltar's golden sands" to the passers on the boats.

Once in sight of the pretty, white-walled, red-roofed town of Tariffa, whence our word "tariff" takes its name, and inside the Strait, boats slacken speed, and, in contrast to the lower Spanish dunes, the African mountains go slowly by, in ever taller peaks,—one of them rising almost to the clouds. Then Gibraltar rises into view, growing ever nearer, while the Dark Continent, for a moment, disappears 'round a bend, and, returning, causes the Strait to resemble a wide river, down which the boat continues its sail. This bit of landscape, which will some day figure so prominently in the eyes of the world, is almost unknown to print, and the vast majority of

Gibraltar as we usually see it

A different view of the Rock

travelers come to the Strait expecting one even waterway of an average width of nine miles. Such it is only near its close, when, at quarter of one the anchor is dropped off Gibraltar itself.

Gibraltar, from this first mooring place, is not the single, jagged peak one always sees in the pictures. Instead, a great, billowy, sandy-yellow rock,—its slopes of tan and brown rolling as might some desert hill, up to an old castle on the sky-line; with curious ribbons marking the roads and an occasional tree-clump or long, retaining wall between,—greets the onlooker. Half-way up, at one point, are the ruins of an old Moorish castle, and almost level with these, at another, the trees of the Gardens give variety to the scene. At the base of this façade of the Rock, however —quite to the surprise of the newcomer —rises a compact, gardenless town, white-walled, red-roofed, and densely set, as is the Moorish style. The new docks and the breakwater, with its latticed sheds running far out into the Strait, in fact, seem the only mark of present-day architecture about this curious hamlet. Coal steamers of but a single deck and that fitted with a Dutch wind-mill, are anchored in the slip, with a warship or two, and a fleet of sails for company; but of people or even a curl of smoke, to betoken human activity, there is not a trace; so that, to all appearances, the town might be some petrified city, or a part of the long, tawny rock behind. Over to the right the hills curve about in pale, romantic blues iridescing into a pinker haze, matching the yellow of the beaches; but there, too, of life there is no sign.

Moorish Feluccas

The picture, beautiful though it is, usually palls on the stranger, for he is apt to see it from *afar* much longer than he cares to. Landing regulations are rather strict, and red tape consumes much of the short space of time that steamers spend here to take freight. An officious little skiff brings out the port doctor, and if there be a case of contagious disease in the steerage, as there usually is on a liner, the yellow flag is flown, and it is quite probable that no passenger saving those going on to Morocco or Spain will be permitted to land at this port; so that folk gather round the raised gangplank in disconsolate companies to bemoan their ill-luck. Possibly a second physician will be summoned, and after a tantalizingly long parley he will succeed in urging the other to allow all but the third cabin passengers to land, during the short space of time remaining for the cases and casks and the many sewing-machines from America to be taken off for this port. Incident to such permission is another long shifting of position, the boat coming to rest, about twenty minutes to two, opposite the heart of the city and within sight of the triangular peak that is usually pictured as Gibraltar. But a sheet of pale-green water, turning to blue beyond the ship, separates the tourist from the sand-colored rock. Whether or not it be true that Gib. is to-day no longer impregnable, the ranges of modern guns permitting warships to bombard from sheltered, inaccessible nooks beyond, Gibraltar evidently succeeds in keeping off some one thousand Americans by the word of two unarmed physicians alone. So tedious, in fact, becomes the wait that the traveler ceases to care whether he stops at Gib. or not; contenting himself with reading his guide-book, and patronizing the venders of the sea-grass baskets of fresh strawberries, figs or pears in the little skiffs all about, and the sellers of fans of feather work or bearing pictures of Spanish bull-fights.

Then, finally, at half past two permission is given and the lighter arrives, to take folk from ship to shore. Tourist parties gather to meet the guide stationed here for their benefit, while other folk form little companies for the hack tour of the Rock. Guides are ever aboard the lighter, looking for the latter class, and niggardly fellows they are, for the most part, refusing to answer the simplest question, (even as to naming the style of ship known as felucca), to those not hiring them. A great side-wheel steamer slips past on its way to Tangiers; and innumerable wine-vessels scurry from the path as we sail in blissful innocence over the most powerful submarine mines in the world.

On the wharf, curious high-wheeled hacks of yellow, a cross between a stage coach and jinrikisha, drawn by donkeys of Moorish breed, await; their drivers inordinately polite and as inordinately great swindlers, so that one must bargain closely and by the hour, or he will come out at the short end of the deal.

Gibraltar city, through which one is driven, is a curious place. Narrow streets wind between homes shimmering with their wealth of white stucco in the sunlight. Side by side, at the very curb—for pavements are unknown—are these houses set, the lower floors given over to a bazaar through whose open doors one may look over the entire stock *en passant*. So narrow are these streets that the congestion at times is worse than at Constantinople; while so steep are the inclines they ascend that the guide is forced to dismount and assist in pushing the wagon up hill. Mules and muleteers block the path, and in disputes over the right of way on especially steep hill slopes, upsets of the carriages are not at all infrequent, and many an American tourist-invader has come away from Gibraltar with an injured limb or sprain, to say nothing of broken jewelry as a memento of his inglorious downfall.

Street-car service at the Rock

The real sight of Gibraltar town is its curiously conglomerate population. Oddest of all these peoples are, of course, the Moors—brown skinned fellows from Tangiers, in tall peaked hoods that rise from long, brown gowns floating down to the pale yellow sandals. Here and there a turban supplants the hood, or a white robe the gown, and the latter is bound in with a gay silken cord at such times. Christian Armenians are numerous, their ruddy complexions curiously white in contrast, as they mingle with the darker folk—in blouse and bloomers reaching to tight-drawn hose and dainty leather slippers. British soldiers are, of course, ubiquitous; there are 10,000 of them on the Rock, handsome in summer uniforms of tan and broad yellow hats of felt. Little English school boys, officers' sons, also wearing suits of yellow, or gay French gentlemen on a summer visit, in suits of black and with beaver hats, are also conspicuous. English ladies of high birth ride in saddle through the streets on steeds from the cavalry stalls, driving from their path the hawkers,—pedestrians with panniers of flowers and fruit, or drivers of burros bearing trays of these wares.

With all this mixture of peoples, however, the silence of the East prevails, and the Westerner cannot conceal his astonishment at the comparatively universal quiet.

Set among the shops of lace-work and bric-à-brac, souvenirs, photos and post-cards, are a Catholic and Protestant church, between whose shadows the American flag now floats, for the Stars and Stripes have entered Gibraltar to the extent of a Consulate,—a two-story building, square and of stucco, as are most of the better class houses, with lattices at the windows to withstand the heat. Just beyond are the Alameda Gardens, a dusty park of oranges and olive and blooming oleanders, set among terraces overhung with blue morning-glories that would be pretty but for their dense coating of dust.

A Moor from Tangiers

From these the road winds up to the Citadel proper, at whose entry the kodak must be surrendered. There, too, the American invaders quietly permit the British sub-lieutenant to tell them off in parties of ten, while young English officers take charge of each lot and lead the way up a steep dusty pathway of gravel, built among tangles of half-parched wild olive, in which, rumor has it, wild apes still thrive, and between whose boughs magnificent bird-eyes are caught, of the harbor encircled by the low blue mountains just across. Ever higher, ever warmer, ever dustier and tiresome is this climb to the Galleries, the one section of the fortress itself that the civilian is permitted to visit.

Through arched passageways of solid stone, with side-aisles leading into the rock at every dozen feet on the right, and a porthole giving views of the harbor on the left, the visitor is led. Mammoth cannon are placed before most of the windows, in niches cut from the solid rock, and at these points one is forbidden to quit the main path. Barrels of water and cases of supplies sufficient to resist seven years of siege alternate with pyramids of shot at the sides of the trail of stone. Since her coming into possession in 1704, England has had abundant opportunity to prepare for war and she has improved upon it.

Christian Armenian and Tourist

Occasionally the galleries lead out into the open and then again into the rock, and one wonders, instinctively, how many armed feet have trodden these halls and how long before martial feet, such as these, will pass through here in actual warfare again. Just within sight of the Commandant's home and a memorial monument, the third gallery begins, and the stranger is forced to retire. So much and no more of the honey-combing of rock is it graciously permitted him to explore.

Returning by the self-same route to his carriage, and again to the heart of the town, it is the usual routine to make a stop at the Post-Office to mail a few views of the Rock; and then, if time permits, to drive out to the "neutral ground," separating British soil from Spain,—returning in season for a ramble afoot among the shops and a chance kodak-shot of the

Moors, who leap or bound out of range so soon as aware of one's purpose. London papers, bearing the first news of the world received in eight days, are on sale on the dock, and wrapped up in these, the tourist sits on the wharf overlooking the magnificent harbor, on the one hand, and the play of the sunset on the Rock on the other, awaiting the tardy lighter. At half after five the tug returns to take the American invader back to his ship where the band is playing the British airs and the British flag floats from the masthead. Cool lemonade from the Moor's own fruit wipes the last trace of British dust from his throat, and at six he is ready to bid Gib. adieu.

Bit by bit, while dinner is served, the Rock is left behind,—one façade after the other appearing and as rapidly disappearing, as the vessel enters the Mediterranean; and after the evening game of pedro and whist it has almost sunk from view. Nor is one really regretful of deserting the neighborhood, picturesque as it is. It is just a trifle too much like living at the brink of a dormant volcano. In these days of the Balance of Power any war between the nations of the earth may involve Great Britain, and almost any such war must involve Gibraltar. And yet, like the happy Neapolitans and the mulattoes of Pelèe, the people of Gib. go on day by day in the shadow of this engine of incalculable destruction, heedless of any sudden political crisis may bring.

MAP FILLING vs. MAP DRAWING

Expert teachers of geography disagree as to the value of map drawing in school work. Teachers who are able to draw maps skillfully and accurately can easily teach children to draw creditable maps. Teachers who cannot draw good maps themselves should give little attention to map drawing but much more to map filling.

Pupils will see facts of location placed on a map which is visualized in their mind. Hence the necessity of having the base map, which children use for showing their knowledge of distribution and location as accurate as possible. The maps that children can make will, as a rule, be more crude and inexact than the outline maps, themselves of no high grade, that can be bought on the market. The filling of maps so as to show the pupil's knowledge of distribution of facts already studied, is a valuable means of summary and review in almost any lesson. The completed map should obviously be as correct as possible and should be produced quickly. Map drawing is generally therefore less valuable than the filling in of outline maps, because the final results from the outline maps are more nearly correct, give a better visual image to be retained in the mind, and have been acquired with the least waste of valuable time.

THE SCOPE OF GEOGRAPHY[1]

BY ZONIA BABER

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THE position of any subject in the school curriculum depends upon its appraised educational worth. Sometimes the mirror of values is turned toward the future, at other times it claims to reflect the present. Geography has moved up and down the scale of educational importance since the time of the cultured Athenians, disappearing entirely from the curriculum when its import was low, returning when the public interest expanded from local to international concern, or when the physical and intellectual life of the people was focused into the same era of time. Geography has never occupied the first place in the school curriculum as a cultural subject, but in rare instances its utility has given it the highest standing, as in the school of navigation established by Prince Henry at Segres in the fifteenth century, and in modern times in the colonial schools maintained by certain European governments. The educational status of the subject has not been due to its content, but to its pedagogy. Teachers have looked upon it as a collection of facts which could be memorized; and if action rather than speech can be taken as a reflex of thought, the majority of the army of teachers still maintain this conception. This does not refer to the superior teachers in every department from the kindergarten to the college, but to the great teaching body which shapes our educational policies. This statement is not based upon deductions from pessimistic theory, but from work seen during the last few years in schools located between the Rocky Mountains and Newfoundland.

The slowness of the progress of educational ideas is realized when we read what Comenius said more than three centuries ago: "We know the elements of geography when we learn the nature of the mountains, the plains, the rivers, citadels, or states according to the section of the place in which we were reared." I doubt if the pedagogues of Comenius' day lent responsive ear to his teaching, but once a true chord is struck it vibrates forever.

A century and a half later Rousseau took up the strain, and in his "Emile" says: "Let him learn his first geography in the town he inhabits, stimulating his imagination by expressing wonder as to natural phenomena."

One hundred years ago Pestalozzi did more than point out the way the pedagogically redeemed should go. He, rising higher than most educational philosophers, tested by practice his inspiring theories. Professor Louis Vuillemin in "Remembrances" describes the method of geography teaching when Pestalozzi had his school at Yverdon, Switzerland. He says:

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[1] Reprinted by permission from Elementary School Teacher, January, 1904.

"The first elements of geography were taught us on the soil. As a beginning our walk was directed toward a narrow valley, in the neighborhood of Yverdon, through which the Buron flows. We were made to contemplate it as a whole and in detail, until we had a true and complete mental picture of it. Then we were each invited to lay in a store of clay which was found on one side of the valley, and we wrapped it up in large sheets of paper we had brought for the purpose. On our return to the castle the long tables were divided among us, and we were left to reproduce in relief the valley which we had just studied. The following days brought new walks and new explorations, each furnishing a higher point of view, and each time a fresh extension was given to our work. We went on in this manner until we had accomplished the study of the basin of the Buron, and from the height of Monte La, which completely overlooks it, had grasped it in its entirety; and not until we had finished our reliefs, then, but only then, we passed from the relief to the geographic map, not being shown it until we had thus acquired an understanding of it."

This, so far as I can find, is the beginning of field work, which has been carried to a greater extent in Switzerland than in any other country in the world.

Ritter made two visits to Pestalozzi's school at Yverdon and was much gratified by what he saw. He says:

"I have learned to value that method which is based upon the nature of the child....it is now my business to bring this method to bear within the domain of geography. There is between nature study and history a great gap to be filled up. I have left Yverdon firmly resolved to fulfil the promise I made to Pestalozzi, namely, to apply his method to geography."

The United States owes to Karl Ritter an especial debt of gratitude, not only for his inspiring books, but for the instruction he gave to his excellent pupil, Arnold Guyot, who brought reform in geography teaching to this country. Harvard little knew what she was doing for the schools of America when, in 1848, she called from Europe that great teacher.

Mr. W. A. Alcott wrote in the "American Journal of Education" in 1858:

"Prior to this, geography as a science had received little or no attention in the United States. A few schools studied Morse's 'Geography,' a few others used a sort of reading book by Nathaniel Dwight, known as 'System of Geography,' which was arranged in the form of questions and answers, but the majority of schools paid no attention whatever to the subject."

In 1825 Mr. Woodbridge and Mrs. Willard published a geography which was much in advance of those then in use. Immediately afterward Mr. Woodbridge sailed for Europe, being the first American who ever traveled abroad to enrich geography teaching.

The learning of boundaries and capitals, the location of cities and rivers was the burden imposed upon the memories of helpless children. Some ingenious teacher, realizing the unspeakable drudgery such a task demanded, devised the plan of singing the geographic text to stimulate the flagging brain over the tedious road, just as the band plays to aid the wearied soldier on his march. I cannot find the name of the author to whom the honor of that most humane invention is due, but the method prevailed in many places in the States throughout the fifties and early sixties.

In 1866 Guyot's "Common School Geographies" appeared. The teachers were poorly equipped for using them, and in the majority of schools the books were unintelligible. Hence, Guyot's "Geographies" proved a financial failure. Mr. Tucker, of New York, in a letter written recently said: "Colonel Parker, of Quincy, Mass., was one among the first teachers to take up the work of Guyot. It was in Quincy that he introduced modeling as a means of geographic expression."

Only within the last decade in this country has geography been able to rear its modest head into the ethereal realm of intellect dominated by mathematics, and to move in the exclusive set of culture, presided over by literature, art, and foreign languages.

According to the dictionaries, "geography" is derived from two Greek words, γέα, "earth," and γραφή, "description," and I think we may say the progress in the teaching of geography has been shown in the transfer of the stress in the pronunciation of the word to the "gea" instead of the "graphe," crudely to interpret a statement once made by Professor T. C. Chamberlain. In the study of the "gea"—the earth—there is a demand for the training of all the senses which the study of the "graphe" precludes. Preyer says: "The fundamental condition of all mentality is activity of the senses." Unless the perceptive faculties are trained, thinking will be defective and judgment unreliable.

Since the study of geography was and is relegated principally to the middle grades in the elementary school, the pedagogy of the subject has been in harmony with psychological beliefs. Reason was thought to be a function of maturity, while the faculty of memory characterized the youthful mind. With the progress of child-study has come a change in the attitude toward the subjects of study. It has been found that even young children are interested in causal relations. Mr. Earl Barnes reports, as a result of his tests with thousands of children, that the majority are interested in the use of a thing rather than in its form or color; they wish to know the relation of things in this great world about them. It is in the intelligent conception of causal relation that we find the superiority of the civilized man over the untutored savage. It is not in the mere statement of causal relation which the child may memorize that he finds pleasure, but in the solution of a problem—the problem, his problem, and not that of a teacher—that he finds the greatest satisfaction. Children, as well as the adult, like to reason from known data to unknown consequences.

The belief that memorized facts stored away in the mind will be ready for use at a convenient time, has hypnotized the best of us. We are daily surprised at the emptiness of the intellectual storehouses of our students, into which we have previously poured a wealth of choicest facts. We fail in the pedagogical application of our knowledge of psychology for the selfsame reason, that the pupil finds his facts unusable. It was not acquired through action. We forget that images which make up the fabric of vital thinking must be related.

Dr. Dewey says:

"Knowledge may be regarded as a sort of bridge, or connecting link between some difficulty in action and a further successful or harmonized activity. Its significance lies in this intermediate position; that, when knowledge is isolated from its origin and its goal it becomes artificial. From this point of view, we do not know how it came into existence, or for what it exists; in being made an end in itself it is made unreal. Knowledge is reduced to information, a load or burden of facts, which the individual has to carry without intelligent purpose."

The student discovers too late that ordinary unrelated knowledge is not power; that only scientific knowledge—unified, related experiences—are valuable.

The test we impose to discern the ability of our students is as fallacious as our knowledge-giving plan. We too often measure the student's power by what he can say, while the world classifies him by what he can do. Life justly criticises our pedagogic results.

The measure of progress in teaching geography is nowhere more strongly marked than in the use of field work. It was begun by Pestalozzi, but has made more headway in this country during the last decade than during all preceding time. Yet when the number of schools doing field work is compared with those which never leave the school buildings, the percentage is distressingly small. Field work has become an almost universal practice in the classes in geology and botany of the best universities of this country, and in some of the high schools a few excursions are made yearly. But in the elementary schools, in the majority of districts, field work is unknown. Why the teaching of Comenius, Rousseau, Pestalozzi, Ritter, Guyot, and others, together with that of all our noted modern geographers, has failed to impress the lesson of field work upon the teaching body, finds its answer, I believe, in four separate causes: (1) The lack of appreciation by the teachers and the parents of its value in illuminating the geography work. (2) The timidity of the teachers in meeting difficulties which the field presents. Few teachers have been trained to read the expression of the world which lies about them; hence they naturally shrink from placing themselves in the position of instructor before a class of active, inquiring minds facing real, natural problems. (3) The physical strain of taking care of, say, forty pupils outside the school room without proper assistance. (4) The expense which is necessarily incurred in visiting places beyond the walking distance from the school building. We know, however, that, if this objection is reduced to its lowest terms, it is not insurmountable. If field work were considered as valuable as other forms of instruction, the expense would not be prohibitive. The American people, have, on the whole, what they truly want. Look at their school buildings and equipment! If we actively desired field work, it would be a part of every school curriculum. We passively want clean streets and good civic governments, but not until we make our demands active will they be granted. The majority of people really believe knowledge is acquired from books. Hence, if children can recite the contents of certain books, they are educated. Books certainly have the greatest function in our modern civilization, but we are all fortunately, or unfortunately, so constructed that we can read from books only our previous self-experience. It is the grossest absurdity to expect the child whose sky-line is an eternal stretch of irregular roofs and whose landscape is made up of dirty alleys, to appreciate the meaning of broad stretches of rolling prairies, dense tropical forests, and high, snow-capped mountains. Yet we find the books which are given to these children who are so unfortunately situated containing the same text as that provided for the children who spend their summers in the country and who travel some part of every year. I believe if the money spent on the geographies for these poor districts was devoted to field excursions, under the direction of skilful teachers, there would be a much larger intellectual and moral return in citizenship than is received from the present investment.

With the best possible conditions the present geographic text is not what we wish it were. There has been a great improvement in the last few years; yet there is still much to be desired. Since advance in geography teaching has been largely in the universities, the best texts have been produced for the colleges. Many of the best books written for children have been the work of college professors, and in some cases they are illy adapted to elementary schools. As in everything else, we have a heavy geographic burden due to inheritance. The old cosmographies which were produced during the fifteenth and sixteenth centuries have, I believe, had no small effect upon the geographies of to-day. The modest title of one by Sebastian Munster, which appeared about the year 1534, illustrates their comprehensive character. It reads: *Cosmography—A Description of all the Lands and States of the Whole Earth—Its People, Animals, Products, Governments, Religions, etc.* Notwithstanding the growth of geographic knowledge, which bears in upon us as we read some of the astonishing statements in this popular work which went through twenty-four editions—such as, "the German Ocean is an inland sea," "Iceland is joined to Norway"--we might still put the same title on the cover of many geographies used in our schools to-day. We have attempted to boil down all the knowledge of all the countries of the whole earth into a book of, say, 160 pages, with the result that it needs much intellectual diluting to be even palatable or digestible. The geographic readers have been a great boon to teachers of elementary geography, yet more are sorely needed. The good teacher must be superior to any text, but excellent books are invaluable.

To aid in solving problems found in the field and in books a laboratory is necessary. Field excursions alone can rarely give the answers to problems which arise as to the genesis of the forms of the earth which we find around us. We see a valley and may trace its circuitous path from its source to its debouchure, but the process of valley-making is so slow, except during severe storms, that we cannot catch nature in magnified action. Hence the physical laboratory is a necessity for the understanding of physical processes. But the pupil himself should have the problem which he has found in nature and brings to the laboratory for solution. Crude apparatus which the child understands and can easily manipulate may be of greater value in experimentation than more refined materials. In the use of a hose and a hole in the ground the child may find greater scope than in an expensive laboratory. The young children love action; hence laboratory experiments are not only fascinating to them, but intellectually productive.

There is, perhaps, no greater evidence of the progress in geography teaching than the advance in the use of maps in all the schools. Yet we regret that what Rousseau said a century and a half ago is applicable to too much of our teaching to-day.

"In every study signs are worthless without the idea they are to represent. Notwithstanding the child's study is confined to signs, it never becomes able to understand the things themselves. While one endeavors to give him an acquaintance with the earth, he makes the acquaintance of the map; he learns the names of the cities, countries and rivers; to the child they are nowhere except on paper."

If you doubt the correctness of the above statement as applied to present educational conditions, try the experiment upon a group of people of naming different places on the earth's surface, letting the hearers describe the first images which come into consciousness. I feel a confidence in saying that a large percentage of any gathering, geographers excepted of course, will see a map instead of the reality, for places they have never visited. Many noted teachers argue that they must see the map first, then force it out of consciousness by the image of the things or places for which it stands. This appears to be an intellectual extravagance. We cannot, I believe, place too high a value upon maps. Civilization could not exist without them, but to encumber the minds of helpless children with images of parti-colored maps, which always appear in consciousness instead of the correspondence to the real country or city, is, it seems to me, little short of a pedagogic crime. We cannot help agreeing with Rousseau in what he says in "Emile":

"You want to teach the child geography, and you seek for globes, spheres, maps, and a host of apparatus! What is the good of all these representations? Why do you not begin by showing him the object itself, so that he knows at least what you are speaking to him about? . . . . After all, it does not so much matter that he should know exactly the topography of the country as how to teach himself about it; it matters little whether he have maps in his head so long as he understands well what they represent and has a clear idea of the art necessary to make them. Behold already the difference between the knowledge of your pupils and the ignorance of mine! They know their maps; he makes them."

It is through making maps of regions visited that the child understands conventions used in map-making. He may make a simple road map showing the direction of travel upon an excursion, or may model the relief seen in sand, or represent it by shading or hatching lines, or show it by contours, or by the international color scheme; and by so doing he gains the alphabet of maps, which is one of the highest accomplishments of the geographer.

Map-making is one of the oldest of the arts. Hence, from the history of its development we may get pedagogic instruction. Among primitive people the necessity for maps found a satisfactory response long before writing was invented. Stanley tells of the aid he received from the Uganda, who made relief maps of their country in the sands along the lake-shores. Travelers in every part of the world have acknowledged a similar indebtedness to the untutored natives, from the islands of the South Seas to the frozen shores of Greenland. Finding that fixed maps could not meet the needs of the hunter, the warrior, and the seafarer, they have shown great ingenuity in the manufacture of portable maps.

The Micronesians, of Marshall Islands, made maps of their islands by fastening stones or shells to a background of woven splints of palm, the size and location of the shells or stones corresponding to the area and position of the islands. They expressed their knowledge of hydrography by widening the splints where the swells or waves increased, as would be the case on nearing land. Captain Cook paid high tribute to the cartographic ability of the South Sea Islanders. He told of his successful cruise through forty degrees of longitude among the Australian Archipelago under the guidance of Tupaya, a native of Tahiti. The Ainos of Japan, and the Tunguses and other tribes of Siberia, have won the gratitude of travelers by the maps which they have made for them. Franklin, Parry, Hayes, and other Arctic explorers have expressed their appreciation of maps made by the Eskimos. The entire Aztec country was mapped when the Spaniards reached Mexico, and these maps were of such excellence that Cortez traveled hundreds of miles by their guidance. They represented mountains, rivers, towns, forests, and political divisions with much detail and accuracy. The Peruvians were also quite advanced in the art of cartography when stricken by the Spanish. They possessed relief and political maps of their country which were of great value to their destroyers.

Economic interests seem to have been a great stimulus to the ancient as well as to the modern map-makers, for the oldest map known to be in existence is one which represents a mining district in Nubia, made during the reign of Rameses II. It represents the mountains and valleys, showing rocks which were rich in ore and those which were barren, not omitting the wells and the few scattered trees along the road leading into that desolate country.

The great problem of map-making with our students, as well as in the evolution of cartography, has been to give graphic expression of geographic facts consistent with an assumed convention. While we may smile at the maps of the Middle Ages, which contain pictures of mountains, houses, men.

and imaginary monsters, yet we must commend the motive which prompted this grotesque representation, for it was a direct appeal to the imagination, and a map which does not arouse the imagination fails in its purpose.

Hereford's very fanciful maps, which gave little heed to the restraining influence of truth, but reveled in delightful imagination, when knowledge was exhausted, lays high claim to usefulness, for to it is imputed the honor of so arousing the imagination of Milton that his poetic fancy gave *Paradise Lost* to the world.

The progress of map-making has been in the direction of greater truthfulness, which also means greater usefulness, but the attempt to be truthful and at the same time graphic has been the maelstrom which has engulfed many cartographers. Those who are striving for accuracy alone in expression cry out against their fellows who are working for more dramatic representation; unwarranted exaggeration is the persistent charge. Yet the fanciful maps of the Middle Ages were more truthful in intellectual result than the best scientific maps of to-day that arouse only their correspondence in consciousness. But the fault is not in the maps, but in our inability to read the symbol.

It goes without saying that everything which tends to fuller geographic concepts aids in the interpretation of geographic symbols. The ease with which the untrained geographer reads a map depends upon its graphic qualities. Hence reliefs, shaded, and hachure maps offer fewer difficulties to beginners than contour, political, and those made according to the international color scheme, or other conventions. As has been said, the mapping of the region visited, using the different conventions which obtain in maps in daily use, is the surest way of understanding the symbols employed, but copying of maps, considered from the educative standpoint, has little, if anything, to commend it and much to condemn it. There is no mental activity in such a process, and much time is squandered which could be spent to better advantage.

If the student, in expressing his geographic concepts, is required to use a convention differing from the one employed in the map he has been studying, the demand will force him to interpret the map into terms of reality. If he has been studying contour maps, he should represent the relief of the area studied by modeling or by drawing with hatchure lines, by shading, or by the use of some color scheme.

Progress in field and laboratory work, and the use of pictures, models, maps, and charts, in teaching geography are not the only signs which herald its progress. We are now beginning to see the relation which exists between the sciences and history. The influence of physical conditions upon the biological aspect of the race, which was so strongly brought out by Darwin and Lamarck, is now being applied to social relations. This new movement, as we wish to term it, was advocated by Herder two centuries ago when he said:

"How does it aid a youth if he merely knows what has happened and cannot locate events? Only through the aid of geography will it become clear to him why certain people had to play a rôle upon the historic stage and could play no other; why sciences, inventions, and arts—indeed, the whole civilization—took the course it has taken and no other. Geography is the basis of history, and history is nothing but the geography of times and nations set in motion."

John Smith, in his history of Virginia, published in 1623, says:

"For as geography without history seemeth a carkasse without motion, so history without geography wandereth as a vagrant without certain habitation. He who studies the one without the other will understand neither. Who despises both should live like the mole under the earth."

No historian of to-day would dare to claim a supreme indifference to geography. Man cannot go entirely beyond his physical environment, either biologically or socially. The effect of climate on the physical, mental, and moral condition of individuals is everywhere admitted, and the influence of topography and native products upon humanity cannot be denied. Although geography has had a great influence upon human development, it furnishes only one part of the interesting story. It is true that the great fertile flood plain of the Nile, surrounded by a nearly impassable barrier, the desert, made Egypt's civilization one of the greatest which has blessed the face of the earth, but its decadence can hardly be attributed to geography. The abundance of marble, we now recognize, gave plastic art to Greece; and the geologic fault which made Wolf's cave possible changed the history of North America. Almost every social custom has a geographic basis.

With the increase of knowledge in these various directions has come the difficulty of selecting a course of study. It is impossible now for any individual to encompass the known geography of the world. Hence what not to teach is as important as what to teach. We cannot select a certain number of facts and say these facts are important, hence should be learned, because the important facts vary with every locality and, we may say, with every division of time. It may be that Hawaii seems important because of her present relation to us, but the world is gradually becoming so closely connected that it is impossible to decide who is our neighbbor.

It is true that if we would be one with society, we must constantly feel the pulse-beat of social life. And the great industrial movement which is now sweeping everything before it, bringing science, art, literature, oratory, and the bayonet to its aid, cannot and should not be ignored; but it should not be given first place in our consideration. So great is the power of this movement that it can turn the heads of the wise and good, as I had evidence in India. I heard a man who is said to be one of the most learned and wisest of Anglo-Indians argue eloquently and feelingly in favor of the opium trade in India. He had lived in that country fourteen years, traveling yearly from one end of the country to the other, collecting material for a great museum of which he is director; but he believes opium is of great value to the country. The glaring light of commercialism has blinded his ethical sight.

Since knowledge *per se* cannot be made the guide to the selection of a course of study, we must seek for it elsewhere. It is in the principles which govern the formation of the landscapes, and those which determine the distribution of peoples, their habits and customs, that we find relief. These, if properly mastered, become the keys which unlock the abstruse geography problems. The ability to interpret landscapes, to see their relation to cultural conditions, to use geographic symbols properly—pictures, models, charts, and literature—must in this day constitute the equipment of the geographer.

A course of study intended for an entire city or country can only designate the very broadest lines of study. For it is just as impossible for the suburban schools to use the same course of study as the schools in the congested districts of the same city, as it is for the children of Jamaica to study the English botanies, which they have attempted with failure.

It is impossible to realize our ideals in teaching so long as the "factory system" obtains in our schools. No teacher can turn out forty pieces of humanity yearly, each bearing the same stamp, and not do violence to them and her better self.

Much of the departmental work is only "piece work"; it is not related to the life of the child. We need more handmade, hand-modeled educational results; less recitation of pedagogic platitudes and more execution; more time spent in teaching the child and less in teaching the subject. Then the child will grow into an appreciation of the harmonies of nature, man and natural law.

EDITORIALS

CAUSE FOR DELAY IN PUBLICATION

IT is with great regret that we have to announce that the Journal will probably be delayed beyond the regular date of issue for the next few months, as was the October number. This delay is not due to the Editor or printer, but to a strike of the typographers which has made it impossible to get the Journal through the press in the usual time. It is impossible now to say how soon the conditions can be improved. We therefore ask our readers to be patient and not to think that their names have been overlooked in mailing, if the Journal is not prompt. The Journal will appear as near to regular date of issue as possible and every effort will be made to make the delay less serious as the months go on.

THE NECESSARY MAP EQUIPMENT FOR A SCHOOL-ROOM

It is a well-known but extremely unfortunate fact that a great majority of the public schools in this country are poorly equipped with the necessary maps for class-room use. In many cases maps are absolutely lacking, in other cases there may be one set of maps for a school building, or perhaps each class-room may have a few maps, many of them old, worn and out of date.

To equip all the schools of a large city adequately with maps is extremely expensive, but on the other hand maps are a long term investment and the cost per year for a complete equipment would be small.

For the best work in geography, history and literature every class-room above the third grade ought to have a Mercator Map of the World, a series of political maps, one for each continent, and physical maps of the United States and Europe. The world map should show the ocean currents and the International Date Line as well as political features. It would be well also if it showed ocean sailing routes and cable lines.

Any class-room ought to have as a minimum equipment a Mercator Map of the World, a political map of the United States, and maps of the continents to be studied in that grade. Less than this is more than inadequate, it is a shameful neglect of necessities.

These maps should be the permanent property of the class-room and should not be allowed to go from the room. Neither should two rooms of the same grade be expected to use the same maps at the same time.

All maps in any school should be mounted on rollers of uniform length, so as to be readily moved from one room to another, thus making it possible for maps temporarily needed to be easily and quickly changed from room to room. Maps should be rolled up when not in use so that they will be kept clean, and so that their features will not be so familiar to the pupils that they will think they know everything the maps have to show them.

Every school-room should also have a political globe at least twelve inches in diameter. This globe should be up to date, and not twenty years old as are some of the "new" globes to be secured in the market. Every school building should have one of two blackboard globes twelve inches in diameter for use in studying world features like latitude and longitude, ocean currents, wind systems, etc.

The minimum equipment is not expensive and should be possible in any large city. Teachers should make it clear to "the powers that be" that maps are absolutely indispensable, not only in geography, but in teaching history, literature and current events. Much of the objection to buying maps is due to the fact that superintendents and purchasing agents think the necessary expenditure is large for any one subject. If it can be shown that maps are necessary in many subjects less objection will be made. A series of maps available and used every day in the year will cost no more than a piece of striking apparatus to be used in one topic only for a brief period annually. Money will often be readily given to purchase apparatus to be kept in a case most of the time. Why should this money not be invested in apparatus to be used every day? Why should not teachers have maps and globes instead? Any teacher ought to be able to make her demands so forcible from the standpoint of relative utility as to be able to persuade a superintendent or school committee to buy maps rather than new pieces of apparatus that have not yet proved their general usefulness.

HOW TO USE A GLOBE

A globe is so necessary a thing in school work that pupils and teachers should become so well acquainted with it that they will not handle it as they would a delicate and valuable piece of bric-a-brac. In teaching the seasons and similar phenomena the globe should be held so that the north pole will point toward the north star in order that the relations of earth and sun may be most accurately represented. In teaching the continents, the land and water hemispheres, the winter and summer hemispheres, etc., the globe should be in the best position for bringing out the desired points. If children have the globe presented to them in a variety of positions, they will be less likely to think of the world as a hemisphere, and will not think that people in the southern hemisphere live with their heads hanging down.

RECENT PUBLICATIONS

The Organization of Ocean Commerce. By J. Russell Smith, pp. viii+155. Publications of the University of Pennsylvania; Selling Agents, Ginn & Co., Boston, Mass., 1905.

An exceedingly interesting monograph dealing with ocean commerce and containing a great deal of geography,. The chapters on Routes and Shipping, and Chapter xii on Ports and Harbors, are especially valuable to teachers.

The Philippine Islands. By Fred W. Atkinson, pp. 426, Ginn & Co., Boston, 1905. A splendidly illustrated popular account of the Philippine Islands by the First General Superintendent of Education. The chapters on Climate, Commercial Geography and Peoples are particularly valuable for reference work or supplementary reading in the higher grammar grades.

The Bontoc Igorot. By Albert E. Jenks. Volume I of the Ethnological Survey Publications of the Philippine Islands, pp. 266, Manila, 1905. A profusely illustrated descriptive volume dealing with the physical features, the customs and industries of the Bontoc Igorot. A reference volume for libraries.

Early Western Travels. 1748-1846. Edited by Reuben G. Thwaites; Vol. XIX, including Letters from the West, by George W. Ogden, Sketch of a Journey through the Western States in 1827 by W. Bullock, Commerce of the Prairies, 1845, by Josiah Gregg, pp. 349. The Arthur H. Clark Company, Cleveland, Ohio, 1905.

The three reprints included in the volume noted above are all entertaining reading, but the section by Josiah Gregg is especially attractive. It gives a splendid account of the manner of travel along the Santa Fe route and of the daily doings of a wagon train. The chapters on Early New Mexico give a very picturesque account of life in the Southwest.

Africa. By Frank G. Carpenter. Carpenter's Geographical Reader, pp. 336, American Book Company, New York, 1905.

The final volume in the Series of Geographical Readers written by Frank G. Carpenter, like its predecessors, is a narrative of personal observations and experiences, written in a readable style, in spite of the choppy sentences, and well illustrated. We note that the author calls the Congo Independent State the Kongo State, in spite of authority.

Undoubtedly this volume is the best supplementary volume on Africa available in the United States.

Industrial History of the United States. By Katharine Coman, pp. xxiv+343. The Macmillan Company, 1905.

An excellent volume of reference for teachers who would understand the present day commercial geography of the United States.

Statistical Atlas of the Twelfth Census of the United States. United States Census Office, Washington, 1905.

An invaluable reference volume for libraries, on the results of the 1900 Census in regard to Population, Agriculture and Manufactures.

ARTICLES IN THE CURRENT GEOGRAPHICAL MAGAZINES

The Geography of American Cities, W. S. Tower, American Geographical Society Bulletin, October. An interesting and valuable summary of the reasons for growth and relative rank of the leading American (United States) cities, grouped as Commercial Centers, Political Centers, Social Centers and Health Resorts.

The Panama Canal, Rear Admiral C. M. Chester; Progress on the Panama Canal, G. H. Grosvenor; The Great Canals of the World, National Geographic Magazine, October. Illustrated popular accounts of the work on the Panama Canal to date and a summary of the history and importance of the great canals of the world.

Exploration and Survey with the Tibet Frontier Commission, Major C. H. D. Ryder. Illustrated account of the itinerary of the Tibet Frontier Commission.

The Field of Geography and Some of its Problems, Sir W. J. L. Wharton. A summary of recent progress in geography. The Geographical Journal, October. Annual Geographical Bibliography, 1904.

Annales de Geographie, September. Annotated summary of the principal articles and books on geography published in 1904. Arranged by subject and also by regions. Valuable for reference for geographers and librarians.

Glacial Features of the Surface of the Alps, Albrecht Penck; Alpine Lakes, Hanging Valleys and Carries, E. J. Garwood; Lone Water, A New Zealand Sketch, H. Mason; An Easter Cruise to Greece, E. Ransome; An American Training College Course in Geography, G. W. Hoke. The Geographical Teacher, Summer, 1905.

The several articles listed above are all most helpful to teachers. The last article contains a well selected bibliography of the untechnical literature available in reference to the several physical divisions of the United States.

NOTES

Some Points on Teaching Geography.—1. Rely on maps and outlines, not on the text-book.

2. Assign the lesson by topics, not by pages; in assigning map lessons, do so without having a map before you.

3. Encourage pupils to ask questions, and furnish examples within their own experience of the subject under consideration.

4. Let each pupil give in his own language all the information he has on the subject.

5. At the close of a recitation have the pupils tell what has been brought out during the lesson.

6. Emphasize all new facts, and connect them with the former lessons.

7. Insist that each pupil keep a notebook.

8. Talk little during the lesson; let the subject be unfolded by the pupils.

9. Make your questions and answers as you would in conversation; eschew the lecture style of teaching.

10. Have plenty of reference books, use them freely, and encourage your pupils to consult them.

11. Teach your pupils to study a country in the light of its advantages as an abode for man.

12. Begin every lesson with a review of the preceding lesson. Frequently have this review a written exercise.

13. Have progressive maps made, to be filled in as the lesson proceeds.

14. Encourage individual work; assign subjects to different pupils to be reported on at the next lesson.

15. Use a dissected map of the United States for drill exercises in form, relative size, and position of states.—*The Western Teacher, October*, 1905.

LOCATING A MERIDIAN.—In the following exercises the chief difficulty to be overcome is for the teacher, and lies in the fixing of the local meridian according to directions given.

This involves evening work and had better be done by the teacher with the assistance of some one or more ingenious boys to be found in almost every school and community. The necessary conditions for locating the meridian are a free view of the northern and southern heavens at or near the school house; a support from which to suspend two plumb lines a foot or two apart; and the time of the evening when certain stars of the northern heavens are in a vertical line above each other. The constellations Big Dipper and Cassiopeia, together with the North Star, are familiar objects to nearly every one. When the stars marked in the accompanying diagram are found by sighting across one of the plumb lines to be directly over one another, adjust the other line so that these stars are in the common plane of the two lines. The smaller the cords and the heavier the weights the better. It may be necessary to have each weight submerged in a pail of water to prevent swinging. It may be necessary, too, to have a lantern that the cords may be seen, especially when indoors. By sighting across these lines from north to south the passage of any heavenly body across the meridian south of the zenith is readily timed.

By having a helper stationed ready to announce the coming to the meridian of any star agreed upon, the teacher may readily adjust *within the school-house and at a south window* two other plumb lines suspended from the casing or from the ceiling so that the same star at the time of its culmination is seen in the plane of such lines. These may then be permanently fixed in position for use indoors at any time, day or evening, as a meridian plane.

(Exs. I) By the use of a watch, known to be a good time-keeper, determine the interval in hours, minutes and seconds between the passage across the meridian of any selected star one evening and of the same star the next evening,—the Stellar Day, and the exact period of the earth's rotation. Repeat with several stars, or with the same star for several different times, taking the average of these values as a final result.

(Exs. II) By the use of a smoked glass to protect the eyesight, take the mean of the times shown by the watch when the sun's west edge comes to the meridian and when the east edge passes it. This will be the instant of the sun's center on meridian. Get the interval till the next day when its center is again on the meridian as the length of the true solar day. Maintain these observations for length of solar days for once a week through several months, and tabulate the results. Note that there is not only variation from time to time in length but as well a regularity of increase and of decrease. Mention should be made here of the fact that as the path of the earth's revolution about the sun is somewhat elliptical, with the sun as one of the foci, so the earth's rate in its orbit varies, being greater when nearer the sun. Variation in lengths of solar days arises from these causes.

Attention should be called to the fact, too, that with the natural unit—the day—variable in length, no clock counting off time units of uniform length can keep with the sun. There would of necessity be continual change in length of pendulum, the division of the day being always into the same number of hours, minutes and seconds. Only on certain days in the year do clocks show noon when the sun is on the meridian. Clocks running with uniform rate keep an average (or mean) solar time, and show twelve o'clock noon when the sun would be on the meridian if solar days were always of the same length. This difference between clock time (mean solar time) and true solar (sun-dial) time is given in the almanacs as ***sun fast*** (coming to meridian before twelve by the clock) and as ***sun slow*** (coming to meridian after twelve by the clock).

[Just how much of instruction like the above shall accompany the observation work of the natural phenomena of the daily life of man must of course depend upon conditions of which the teacher is to be judge. No attempt is made in any of these nature studies to parcel out the work by grades. This is best done by teacher or superintendent.]—*The Nebraska Teacher, October,* 1905.

THE GEOGRAPHY LESSON.—A geography lesson often furnishes material for a future drawing, language or spelling lesson. The following suggestive words, based on the study of Holland, will furnish material for such lessons: Wind-mills, embankments, skates, sleds, art galleries, wooden shoes, boats, Rembrandt, canals, dykes, The Hague, poem, etc. As the child recalls the word, the teacher can write it on the board. The teacher can suggest any special word that has been omitted. This can be applied to any state or country.

"Interest must be excited, faith inspired, mind dealt with." Many little devices, such as journeys, letters and puzzles, using geographical names, can be used to awaken interest. The children delight in tracing the course of a ship, naming the ports where it will stop, the goods taken on, those put off, etc. Make a promiscuous list of points of interest, cities, rivers, mountains, lakes, etc. Classify as to: What is it? Where is it? Do not use any device or method too constantly. "Variety is the spice of life."

The cause and effect, the influence of environment, climate and such topics, should be kept in mind, but not entered into too deeply, for the higher grades can give more thorough attention to these phases. The *awakening,* the *guiding,* should be the central thoughts of this grade.

Some one has said, "The first requisite for the successful teaching of this subject is a spirited and intelligent teacher; a wide awake, magnetic spirit, who will truly be a guide to the pupils, through their journeys and investigations, infusing life with every stage of advancement."—*Ohio Educational Monthly, October,* 1905.

METHODS FOR DETERMINING DIRECTION.—An examination of several thousand grammar school graduates, coming from a large number of public and private schools in various portions of the United States, has shown that a large proportion of such pupils have but little or no knowledge of direction or of the methods used in determining it.

To many adults, as well as children, the expressions "the north side of a house" or "the east side of a street," have as little meaning as would the same ideas uttered in the Japanese language.

Many persons can not locate the points of the compass without the use of that instrument, of whose variations and inaccuracy they have but little notion.

To the traveler, the mariner, the woodman, and all persons engaged in rural occupations the ability to determine direction at any time or place is a matter of prime importance; even to the town dweller enough cases arise requiring a knowledge of direction to justify spending considerable time in the lower grades in studying this fundamental part of the common knowledge that everyone should possess.

One of the simplest methods and the one which many teachers seem to regard as the only necessary one is to face the rising sun, calling the direction in front of you east, that back of you west, that toward your extended right hand south, and toward your left hand north. By facing the setting sun these directions are of course directly reversed with reference to the corresponding portions of the body.

A little observation will show that this is a crude and inaccurate method; for only at the time of the equinoxes, March 21 and September 21, does the sun rise directly in the east and set directly in the west, and in winter it rises many degrees to the south, and in the summer many degrees to the north of these cardinal points, attaining its greatest distance from due east at the time of the solstices, June 21 and December 21. In order to realize how great are the changes in the position of the rising and the setting sun at different times in the year, children should be required to note where the sun rises and sets with reference to the buildings, trees or mountains in their vicinity. The variation of these positions will, of course, make a great difference in the direction of the morning and evening shadows—the winter shadows at these times being cast to the north of an east and west line, and the corresponding summer shadows to the south of this line. The midsummer sunshine on the north side of a house at these hours should also be noted. Children should be taught to determine the time of day by the shortening or lengthening of the shadows before and after noon. An accurate method of determining true noon is to note the exact moment when the shadows cease to shorten, on any day in the year. The sun is then due south, and has attained its greatest height for that day. In our latitudes the shadows it casts at this time are pointing due north, and a perpendicular to this line will give us a true east and west line. From the time of day that the shadows occupy a north and south line, such a line is called a noon-mark or a meridian mark (*meri*-middle and *dies*-day). In locating this noon-mark it should be constantly remembered that there is often a great difference between the mean solar noon of the clock and of the true noon, which is the crossing of the meridian or the culmination of the sun—a difference sometimes of over sixteen minutes. It should also be remembered that unless one is directly on the meridian from which standard time is calculated, that the difference between local and standard time may cause an apparent discrepancy. City children should be taught how people in remote rural districts regulate their time-pieces by adding or subtracting to the time of true noon, indicated by the falling of the noonday shadow on the noon-mark, or on the proper place on the sun dial, the number of minutes which the almanac says that the sun is fast or slow for that day.

In America we have recently begun to teach a method which has been taught in Germany for many generations. If we hold a watch, face upwards, with the hour hand pointing to the sun, the south point will be half way between the twelve o'clock mark on the dial and the place toward which the hour hand points. At noon, there is of course no difference in these two directions. Greater accuracy may be obtained by placing the watch on a board, into which a needle is so placed as to make its shadow cover the hour hand at the time of observation.

One of the most ancient and best methods of determining direction is by observation of the North star. The children should be taught to locate the familiar constellation of the Big Dipper, otherwise known as Ursa Major, or the Big Bear, and then, by drawing a line through the two stars forming the side of the dipper on the opposite side from the dipper handle, and in a direction away from the bottom of the dipper bowl, the position of the North star, or Polaris, may be found by looking for the first fairly bright star on the line thus determined. This star receives its name because it is the nearest of any bright star to the place in the heavens directly above the north pole of the earth, and hence the center of the apparent revolution of the stars. Being about one and a quarter degrees away from the true pole, the accurate determination of true north depends on careful measurements of the mean of the various positions of Polaris. Properly defined north is direction toward this north Celestial pole, and south, direction away from it, east being the direction toward which the earth turns on its axis, and direction toward which the planets and their satellites circle around the sun; and the west is the direction toward which the sun and the other heavenly bodies make their daily apparent journeys.

When the northern heavens are clouded, the south point of the horizon can be located by noticing the place where the stars seem to stop in their ascent in the heavens, just before the descent toward the western horizon begins.

In the newer portions of our country the system of land surveying makes the determination of direction a matter of the greatest simplicity. With rare exceptions, as when the course of a mountain ridge or a large stream may determine their courses, all roads and boundary fences run with the cardinal points of the compass, which also determines the directions of the walls of buildings, which are naturally those of the adjacent roads. A marked exception to this rule is found in the course of the streets of the older portion of Denver, which do not coincide with any prominent direction, although the newer portions of this city have their streets running as nearly north and south as the converging meridians will permit, and the intersecting streets have a due east and west course.

Plants in their efforts to secure the greatest amount of sunlight, or to avoid the excess of light and heat, often give us good indices of direction. The stimulating effects of direct sunshine cause a growth of leaves and branches on the northern side of a tree—a growth so great as sometimes to make the tree top-heavy, resulting in its overthrow in wind storms, especially when the supporting surface roots have been injured by forest fires. On the other hand, plants like the violets, mosses, and lichens which desire to avoid loss of their watery contents will seek the shady, northern side of a tree or a rock. At night wood-men find their way by feeling for the moss and lichens on the north side of trees. A number of plants whose leaves can not stand the full force of the midday sun secure protection by presenting the edges of their leaves to the noon-day glare, thus giving the plant a curious flattened form in a north and south plane, giving origin to the name Compass plants. The common prickly lettuce of our autumn fields seems to make efforts to become a compass plant. The difference in the amount of water held in the soil on the northern and southern sides of valleys often determines the presence or absence of many plants, especially in the semi-arid regions of the West. The greater length of time that the snow lies on the ground in the spring enables the north sides of our foothill mesas to be covered with bushes which are absent from the sunny southern slopes. The premature development of plants getting the reflection from a south-facing cliff is a matter of common observation, and a fact that is utilized to grow in northern climes plants not very well adapted to the climate. Some flowers so habitually turn their faces toward or away from the direction of strongest light that even on cloudy days a rough approximation of direction may be formed. Foresters claim various ways of determining direction, by the thickness of the bark on certain sides of trees, or the pointing of the topmost twigs of other trees, etc., some of which methods lack confirmation.

In regions of fairly prevalent winds directions can be determined with a fair degree of accuracy. The determination of direction by the flight of birds in their annual migrations is not as accurate a method as is supposed, as they frequently follow the course of a range of hills or that of some prominent stream, rather than a due north or south direction.

Children should be taught that the compass needle does not point to the north pole, but toward the north magnetic pole, a point which, although it may lie in the same direction as the north pole, is often many degrees to the east or the west of the true north; that the position of this magnetic pole varies from time to time, rendering former compass readings apparently inaccurate. The pupil should also be shown how easily the compass pointer is diverted by the attraction of small amounts of metal, and that often unsuspected causes, like magnetic storms, may cause it to give false information. Because of these frequent vagrancies, surveyors are constantly on the alert for any causes of disturbance, and are frequently noting the differences between the directions indicated by their instruments and the more accurate direction given by the positions of heavenly bodies.—*Colorado School Journal, Oct.,* 1905.

Geography Test.—[Sample of principal's test given to grade VII. in one of the Waterbury schools.]

I.

1. Why has New England so many harbors?
2. What caused the extremely rocky surface of New England?
3. What is the chief occupation in New England?
4. Why?

II.

1. Where is the Piedmont Region or Plateau?
2. Give two reasons why this region is good for agriculture.

III.

1. Compare the surface of the Coastal Plains with that of the Piedmont Plateau in height, character of rocks, and soil.
2. How were the Coastal Plains formed?

IV.

1. Toward what bodies of water do all the long, gentle slopes of the continent descend?
2. Where are the short, abrupt slopes?

V.

1. How far does the "Fall line" extend?
2. Name two reasons why there are so many cities situated on this line.

VI.

1. Why is the coast line of the southern states more regular than that of New England?
2. How are portions of the deserts in Colorado, Utah, and Southern California made productive?

VII.

1. Name four states that produce cotton.
2. Where is the greatest mining region in the United States?
3. Name two states noted for their valuable forests.
4. Name two states noted for their production of coal.
5. Name a great wheat-producing state.
6. Where are the "Bad Lands"?

VIII.

1. Compare the Rocky Mountains with the Appalachian Mountains in regard to height and age.
2. How wide is the great flood-plain of the Mississippi?
3. What is the principal occupation of the people occupying this region?
4. Why?
5. What are levees?

—*The Journal of Education.*

THE TRANS-SOUTH AMERICAN RAILROAD.—The resumption of work on the railroad between Buenos Aires and Valparaiso is announced. The completed line will be 893 miles long, and in the Andes region it will cross elevations over 10,000 feet above sea-level. The only section not yet built is in the Chilean Andes, and is 29.76 miles in length. When this very difficult part of the road is finished only a day and a half will be required for passage between the capitals of Argentina and Chile.—*Amer. Geog. Soc. Bull., October,* 1905.

A METEOR AT HOLYOKE, MASS.—On October 13, 1905, a number of people in Holyoke had an opportunity of observing a very rare phenomenon, that of a full fledged meteor "shooting" at such a time of day that it left a brilliant line of light marking the path which it had taken through the sky in its course toward the earth.

It was about 5.20 P. M. and the sun had just set behind a neighboring hill, leaving a most beautiful bank of golden color in the western sky. It was dusk and as the meteor fell in the west it was very easily distinguished.

The attention of all who observed the meteor was immediately arrested by a bright streak of light which was left in the wake of the meteor extending straight up about 10 degrees from the point in the horizon where the meteor had disappeared. It was very evident that this streak marked the path which the falling meteor had taken.

This streak remained for fully ten minutes until the light from the fast sinking sun had so far weakened that the line gradually disappeared.

Evidently the conditions were ideal for such a phenomenon. It was dark enough to make the meteor stand out against the sky and enough sunlight still remained to light up the meteoric dust and mark the trail.

It was a novel and instructive sight to all who witnessed it and one that we shall remember for a long time to come.—*M. D. C.*

SOME TYPE LESSONS AS LABORATORY WORK IN GEOGRAPHY.—I. *Waters of the Atmosphere.*—Exp. 1.—*Vaporization.*—In each of the following experiments as performed observe (obs.) what occurs.

(a) Cover the bottom of a saucer one-eighth inch deep with water; leave exposed to the air for a day.

(b) Thoroughly wet a piece of cloth, as a handkerchief, with water. Hang up freely exposed to the air for several hours.

(c) Boil a very little water in a test tube (tt), noting any change in the quantity of water from time to time.

(d) Hold over the boiling water in (c) a wide-mouth (w. m.) bottle with dry cool sides.

Infer (inf.) from these several experiments (1) what becomes of the water; (2) at what temperatures vaporization of water occurs most rapidly; (3) some sources whence the supply of moisture in the air is maintained; (4) under what conditions vaporization from land and water surfaces will go on rapidly; (5) the relation to each other of the processes of vaporization and condensation; (6) the distinction between a vapor (as of water) and a gas or mixture of gases (as of air); (7) the usual change whereby atmospheric moisture is condensed; (8) the different conditions involved in formation (a) of dew and rain, (b) of white frost and snow, (c) of fog and cloud; (9) the cause of the appearance of "steam" at the mouth of a tea kettle of boiling water, and then its disappearance a little farther outward.

Inf. why in some regions of earth sudden and even extreme fall in temperatures may cause no precipitation either of rain or snow. What must be true of the general character of a region and of its fitness for habitation when the atmosphere is largely destitute of moisture? For inland regions far distant from large bodies of water how account for the supply of atmospheric moisture to provide ample rainfall. Explain (1) why in winter we sometimes can "see our breath," and at other times cannot; (2) why the clouds of a morning sometimes thin out and disappear as the sun rises higher and higher; (3) why as it continues raining the clouds often break away giving place to clear skies.

Exp. 2. *Latent Heat.*—Heating slowly, stir continuously with a thermometer some ice cold water containing small lumps of ice. Heat till the ice is melted and the water boils. Obs. the temperature (1) at the beginning; (2) from time to time while the ice is melting; (3) during the time till the water boils; (4) during the boiling as the water is heated more and more.

Exp. 3. Obs. the temperature of a thermometer. Wet the bulb with alcohol (or water) and wave back and forth in the air. Obs. the lowest temperature it records. Repeat, having a tuft of cotton tied on thermometer bulb, wetting tuft with alcohol. Inf. what becomes of the alcohol. Recall by what means vaporization of liquids has been accomplished before. Inf.

explanation of the thermometer changes. Inf. concerning this heat of vaporization when the vapors are condensed, changing to liquids.

Exp. 4. Let an iron spoon be heated hot; then into it pour water a little at a time. Obs. what change occurs (1) in the water; (2) in the temperature of the spoon. Inf. what becomes of the heat of the metal largely. Inf. (1) the part that vaporization plays in the temperature of any region intensely heated by the sun as during our days of summer; (2) the probable temperature of land surfaces largely destitute of water under a summer's sun. What in part explains the refreshing coolness that frequently follows a summer shower? Explain the part played by the latent heat of vaporization in delaying warm weather in the spring. Explain the heating of rooms and buildings by steam.

Apparatus and Supplies.—Test tubes; w. m. bottle; thermometer; ice; alcohol (wood alcohol will answer); tin cup; alcohol lamp; spoon.

Books for the School Library.—*Gregory and Simmons, Elements of Physics and Chemistry, Part IV, Macmillan Co., 50 cents; *Major, Domestic Science, Blakie & Son, $1.25; Tyndall, Forms of Water, Appleton, $1.50; *Tarr and McMurry, Geography, Part I, Macmillan Co., 40 cents.

II. *Winds and Weather.*—Exp. 1. *Pressure Exerted by the Atmosphere.*—Tie in loose folds some sheet rubber over the large end of a student lamp chimney, making air-tight the rubber covering. Blow into the open end of the chimney and obs. the rubber. Compare the amount of air in the chimney now and before. Inf. the condition of the air within. Compare its condition with that of the air without. Inf. what the air within does to the rubber. Inf. why the rubber is pressed outward.

Exp. 2. With the same apparatus suck some of the air out and obs. Exhaust more of the air and obs. again. Compare in both cases the amount of air remaining in the chimney with the amount at first. Inf. why the rubber was forced inward in both cases and why more in one case than the other. Inf. the relation between the pressure on each side of the rubber and the density within and without. With the density of the surrounding air remaining the same, inf. how the greatest possible inequality of pressure on the sides of the rubber covering might be secured.

Exp. 3. Closely fit into a w. m. bottle a rubber stopper through which is passed two glass tubes, one long the other short and bent at a right angle. Let the long tube dip beneath some water in the bottle. Through the other tube blow gently into the bottle and obs. the water in the long tube. Inf. the condition of the air in the bottle. Inf. why the water rises in the tube.

Repeat the experiment, blowing harder, and obs. as before. Inf. the relation between the degree of compression of the air in the bottle and the heights of the columns of water. Inf. when the rising column will come to rest. Inf. how long it will remain stationary.

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* For teacher's desk or class use.

Close the upper end of the filled tube with the finger, remove the mouth, and obs. Exhaust some of the air from the bottle, and obs. the height of the water column. Inf. by what the weight of the water in the tube is sustained.

Exp. 4. *The Barometer.*—Fill a glass tube, at least 30 inches long and closed at one end, with mercury; holding the forefinger close over the open end, invert the tube and plunge the open end under some mercury in an open dish. Remove the finger, and obs. the mercury column. Inf. why the mercury column is thus sustained above the level outside the tube. Inf. concerning the condition of the space above the mercury in the tube. Inf. when the height of the column will become stationary. Inf. the explanation of any change in its height. Measure the height of the column above the mercury level in the dish. As mercury is 13.6 times heavier than water, calculate what height of water column would be supported by the same atmospheric pressure.

Exp. 5. Make a study of a mercury barometer, noting of it (1) the mercury cistern and how the air pressure from without reaches the mercury surface; (2) the heights of the mercury column from time to time, and from what point this measurement is taken in all cases; (3) the provision for reading the height of the mercury column to the fraction of an inch. Inf. the effect of the presence of any air above the mercury (a) upon a rising barometer column; (b) upon a falling column. Inf. the significance of any changes in height of mercury of barometer.

Exp. 6.—*Causes of Change in Atmospheric Density.*—Close a tt with a rubber stopper through which passes a glass tube. Invert the tt and hold the end of the glass tube under water. Heat the tt and obs. the mouth of the glass tube. Inf. concerning the action of the air of the tt. Inf. concerning the density of the remaining air. Allow the tt to cool with the glass tube still under water. Obs. and inf. Inf. concerning the density of air as it cools.

Exp. 7. *Table (by Regnault).*—Weight of a cubic foot of air and of the vapor it contains in grains, with the barometer at 29 inches, and with the temperatures Fahrenheit as follows:

Degrees Fahr.	When Dry	When Saturated with Water Vapor	Weight of Water in Saturated Air
0	604.8	604.1	0.553
32	564.9	561.4	2.128
62	532.7	522.9	6.167
102	494.9	461.3	20.979

In the table note the relative density (1) of dry air and saturated air at the same temperatures; (2) of air as the temperature is increased, both the dry and the saturated. Note the amounts of water vapor held by air as its temperature is lowered.

Inf. concerning the barometer reading (1) in a warm moisture-laden atmosphere; (2) in a cold dry atmosphere. Inf. the probable cause of a falling barometer with temperature stationary or rising.

Exp. 8. *Currents in the Atmosphere.*—Over two holes cut through the cover of an empty cigar box in which all cracks are sealed, set two chimneys made air tight at the bottom by grease or oil. Have a bit of a candle burning within one of these. By means of the smoke from an extinguished match test for air currents at the tops of the chimneys. What is true of the relative temperatures of the air in the two chimneys? Inf. what the air in the box will do because of these conditions. Explain why the air goes down one chimney and through the box. What of the temperature of the warmed air after leaving the chimney? Trace its possible course to make a complete round of circulation.

Let there be in one region of country a warm moist atmosphere, and in some adjoining section a cold dry air. Trace a complete circulation of atmosphere made possible thereby. Inf. for how long this will be maintained. Inf. in what part of this circuit the air current will be along the earth's surface. Inf. when this air current will cease to exist—die out.

It may be well to distinguish among the parts of this circulation by limiting use of the term "wind" to the surface current, as distinguished from (1) the ascending and descending currents; (2) the upper air currents. With such use of the term, inf. (1) where a wind originates (springs up); (2) from what direction a wind blows; (3) where it ends (ceases to be a wind). Inf. at what places in this round of circulation to an observer on the earth there will be no wind—a calm.

With an upward current established, and independent of any temperature and moisture changes, inf. the effect on the barometer readings of (1) an upward movement of atmosphere; (2) one downward.

Exp. 9. *Areas of High and Low Pressure.*—In some parts of the world the sun at noon is directly overhead—in the zenith. At what time of year is there nearest approach to that condition here? The more nearly vertical the sun's rays fall on the earth's surface the hotter is that region.

That portion of the earth where the sun's rays are always vertical reaches east and west around the globe across northern South America, central Africa and southern Asia as well as the oceans lying between. Inf. a result of the continuous intense heating of the surface of the immense water areas of this region—the Torrid Zone. Inf. three causes combining to make the barometer readings relatively low along the line of vertical rays of the sun—the Heat Equator.

Of these ascending currents of hot moisture-laden air, inf. (1) their directions as upper-air currents; (2) their temperature as they ascend, and a direct result of this; (3) the density of such air following such changes; (4) the tendency in altitude of upper air as it moves from equator northward. In moving over land areas of varying altitude, say the continent of North America, in what regions are such currents likely to touch surface, and moving along such surface be known again as Winds. Inf. concerning the character of such winds as to (1) temperature; (2) moisture held by them.

Were the earth not rotating on an axis this movement of the atmosphere northward from the equator would be due north; but because of such rotation this course poleward is more a northeasterly movement. Where the air of this northeasterly moving current, cold and dry and dense, feeds down continuously, inf. what is likely to be true of the direction across country of the moving condition resulting from this downpour of the upper atmosphere. Inf. concerning the barometric readings of those sections over which in turn this condition (downpour) occurs.

With descending air currents in one section of country what may reasonably be expected in some adjoining section that equilibrium of atmosphere may be maintained? What conditions of atmosphere in any region is likely to favor the development there of an ascending current? Inf. (1) the directions from which winds will blow towards these areas of low pressure; (2) the condition of atmosphere as to a wind at the center of one of these areas. With one of these "lows" to the north of us, were it not for the earth's rotation, a wind from the south would pass us; as it is, such a current enters the S. E. quadrant of the "low;" likewise, what would have been a north wind enters from a northwesterly direction.

Exp. 10. *Weather as Affected by Highs and Lows.*—In this central west the moisture-laden winds are largely from the Gulf, and enter very generally the southeast quadrant of the "lows." By reason of the lessened pressure experienced in such areas and as ascending currents, there is an expansion of such air and a consequent cooling of it whereby the skies are beclouded and more or less of the moisture precipitated as rain or snow. In like manner, the cool dry air from the north and northwest on its way towards a "low" has its capacity for moisture increased as it warms, dissipating the clouds and bringing clear skies and bright sunshine. Inf. concerning the wind direction, relative temperature of atmosphere and appearance of the sky (1) as the advancing eastern edge of a "low" comes over a section of country; (2) when such "low" is central over that region; (3) as its western portion passes. In like manner inf. the successive changes of weather as a "low" forms to the northwest of a locality, moves to the north, and then to the northeast of it; (2) when the "low" is to the southwest, the south and southeast of any locality.

Exp. 11. *Weather Maps.*—From a series of two or three maps showing the progress of typical storm areas, locate and explain the significance of (1) the isotherms; (2) the isobars; (3) the wind directions from a high; (4) the wind directions into a low; (5) the modification of temperature of a whole region by an advancing high; (6) how the isotherms "run" with the lows; (7) the areas of precipitation. Inf. concerning any precipitation in front of an advancing high. Account for wind directions at any point not in accord with the general atmospheric circulation about and into a low, and out from a high. Inf. the significance of the term cyclone as applied to a low, and of anti-cyclone applied to a high. Inf. what conditions largely determine the wind velocities reported at various points.

Apparatus: Student lamp chimney; rubber tissue; w. m. bottle; r. stopper; 2 holes (for bottle); glass tubing; alcohol lamp; mercury; barometer; test-tubes; r. stopper of 1 hole (for tt); cigar box; chimneys; candles; weather maps.

Books for the School Library.—Archibald, Story of the Atmosphere, Appleton, 40 cents; Bigelow, Weather Forecasting, U. S. Dept. of Agr. (Bulletin No. 20), free; Davis, Elementary Meteorology, Ginn & Co., $2.50; Harrington, About the Weather, Appleton, 60 cents; Tarr and McMurry, Geography, Part IV, Macmillan Co., 50 cents—From *Nebraska State Normal School Bulletin,* April, 1905.

JAPAN AT WORK IN MANCHURIA.—Japan's commerce has followed hard upon the heels of its victorious armies. Less than two months after the latter battle, trains were running from Liao-Yang to Mukden over a temporary bridge spanning the Hun River; and regular train service from Port Dalny to the Manchurian capital followed immediately. Thousands of soldiers have been employed in clearing Mukden and the battlefield, to guard against disease when warm weather arrives, and all the sanitary precautions so successful in handling the army have been enforced. Besides finishing the Central Railway through Japan itself, many locomotives have been ordered for both Manchuria and Korea, 157 leaving Seattle on a single steamer; trade is beginning to flourish at Liao-Yang, and already there have been circulated $25,000,000 of war notes on a par with the silver currency. —*World's Work,* June, 1905.

FERDINAND VON RICHTHOFEN AS A TEACHER.—Finally I come to the most important side of his influence, that side which certainly brought him the greatest personal honors and assured the broadest scope to the influence of his genius, viz.: his activity as a teacher in the University of Berlin. To this in particular is due the fact that his conception of Geography as a division of Natural Science, characterized by strictly inductive methods of research, exerted such masterful influence throughout Germany. The world could not sufficiently express its thanks should it be possible to preserve in print, for the use of future generations, the notes taken at various of his conferences and lectures so rich to overflowing with original ideas and brilliant resumes. Yet even such a publication could not supply that part which was the best of all, the inspiring influence of his personality, especially as it manifested itself in the *"Colloquium"* which he founded. This weekly assembling of his students for seminar exercises has long been famous as the hotbed of young talent in Geography, whence has already been drawn a large proportion of the present teachers in Geology and Geography at the German Universities.

Richthofen's methods in his *"Colloquium"* were peculiar. He practically never gave direct instruction, rather he withdrew almost wholly into the background merely guiding the talks and discussions by slight touches and remarks. He rarely voiced a criticism of the paper read and took but slight part in the discussion of it. The chief thing was that he was present, for the force of his personality exerted such an influence that each of us girded himself up to do his best. He never exerted a dictatorial influence in favor of any dogma whatever; insisting only upon fearless criticism, logical arguments and absolute adherence to facts, in all other respects perfect freedom was allowed for the development of independent individuality. The wisdom and fruitfulness of this method is eloquently testified to by the simple fact that his former students, even after they had won independent positions in the world and as investigators, yet always kept in close touch with the *"Colloquium"*; and whenever circumstances permitted they attended its meetings as of old, contributing from the riches of their personal experiences to the intellectual store of the debates. Thus it was that even the most widely different themes found a wealth of information upon them represented among the members of the circle, and the discussions always developed most instructively.

For the same reason, also, Richthofen's *"Colloquium"* became not only a reunion of students of science, but of personal friends. It was a circle whose members held together through years and decades in such a manner as to certainly mark it a unique assembly among University seminars. Here again the cementing bond and ferment of this union was von Richthofen himself. It was but another tribute to the strong human influence of this man's personality, a man not only to be admired but to be loved as few others are, an aristocrat from crown to sole, a nobleman in the highest, most beautiful sense of the word.—Translated from *"Täglichen Rundschau,"* Berlin, 12 October, 1905, by C. Abbe, jr.

THE SNOW HUTS OF THE ESKIMO.—The climatic control of the materials of which human dwellings are constructed has often been emphasized, and the general fact of snow huts in the Arctic, of light construction of leaves and bamboo in the moist tropics, or abobe houses in arid regions, and so on, are well known. The details of construction, however, and the more minute control of climatic conditions, have not, as yet, received adequate attention. For example, in the case of the snow huts of the Eskimo, it appears on the authority of Klutschak, as reported by Woeikof, that these huts, which are arched, are never constructed out of the first snow which falls. The Eskimo waits until successive snow-squalls and high winds have packed the snow down hard. In such cases as this, the density of the snow is not due to the weight of the snow, nor to successive thawings and freezings, as in the case of the formation of the névé, but it is simply the result of packing under wind action.—*American Geographical Society Bulletin, November,* 1905.

NEWS ITEMS

Dr. A. J. Herbertson, one of the associate editors of this JOURNAL since its first appearance as the *Journal of School Geography* in 1897, has been made the head of the School of Geography at Oxford, with the title of Reader in Geography. Dr. Herbertson takes the place of Mr. H. J. Mackinder, who has resigned to devote his whole time to the London School of Commerce. Dr. Herbertson is Honorary Secretary of the Geographical Association and editor of the Association's quarterly magazine, *The Geographical Teacher.*

The Second Annual Meeting of the Association of American Geographers, under the presidency of Professor W. M. Davis of Harvard University, will be held at the rooms of the American Geographical Society, New York City, on December 26 and 27, 1905.

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A STUDY IN HUMAN GEOGRAPHY*

BY ELLEN CHURCHILL SEMPLE, Louisville, Ky.

MOUNTAIN PEOPLES IN RELATION TO THEIR SOIL

FUNDAMENTAL in the study of geographic environment is the relation of a people to its soil. From the nature of that soil, the proportion of it available for economic purposes, the possible methods of its exploitation, the amount and kind of its products, and the ease or difficulty in marketing the same, spring a long line of direct and indirect influences of geographic conditions which leave their stamp upon the national life and character.

Soil means primarily food. The constant concern of man is his food supply. Clothing, shelter, and even fuel, since its consumption varies greatly with the seasons and climate, are questions that force themselves upon his attention only intermittently; but the cry of the body for nourishment is persistent. For this reason desert areas, denying all sustenance, have no inhabitants except transitory caravans and pastoral nomads picking their way from oasis to oasis across the sandy wastes. Regions affording a limited or uncertain food supply, or yielding no minerals to be exchanged for food or made the basis of local industrial wealth, show a sparsity of population which reflects the meagre productivity of the land. To such regions belong most mountain systems, whether without ores and coal, like the Laurentian Highlands of Eastern Canada, the Scandinavian Mountains, the Swiss and Tyrolese Alps; or whether possessed of great mineral wealth left undeveloped because of inaccessibility, as in the Appalachian Mountains of eastern Kentucky and Tennessee; or because of the low economic status of their inhabitants, as in the rich ore-bearing ranges of the Chinese province of Shansi. True the exploitation of the mineral

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*Reprinted from *The Geographical Teacher*, Autumn, 1905.

wealth of a highland region means in general only scattered mining camps with wide stretches of sparsely-inhabited wilderness between.

The resistance of mountains to the spread of population by their mere elevated surface serves often to exclude settlers. The difficulty of making a path up steep rocky slopes and through the dense forests usually covering them is deterrent enough, not to mention the general infertility, paucity of arable land, and harsher climatic conditions which characterize mountains in contrast to the plains. Hence, as a rule, only when the pressure of population in the lowlands becomes too great, do cabins and cornfields begin to creep up the base of the slopes. In 1840 the flood of population had spread westward in the United States as far as the ninety-seventh meridian and the north-south course of the Missouri River; but out of this sea of settlement the Catskill Mountains, the Adirondacks, the Southern Appalachians and the Ozark Highlands rose as so many islands of uninhabited wilderness, and they remain to-day areas of sparser population. The Mittelgebirge of Germany were not settled till the Middle Ages. Vast stretches of the Rocky Mountains, of the Laurentian Highlands, and of the Central Swiss Alps are practically uninhabited to-day.

A comparison of various countries will show a decrease in density of population with every increase of height beyond a certain altitude, except in a few favored mining regions, and in many tropical lands where better climatic conditions and freedom from malaria distribute settlements far above the steaming lowlands, and push the line of increasing density up to six thousand feet or more. In every mountain region the composition of the soil as affecting its fertility, the grade and exposure of the slopes as determining respectively the ease and success of tillage, the proximity of the highlands to teeming centers of population, and the general economic development of its people, are all factors in the equation, as well as altitude and zonal location.

In Great Britain, the sparsest population is found in the highland moors of Scotland, where the County of Sutherland has only 13 inhabitants to the square mile, and Invernesshire only 20. In these figures speaks also the remoteness of a far northern location. In the southern half of the island the sparsest populations are found in the Welsh county of Radnor, with 49 to the square mile, and in English Westmoreland with 85, both of them mountain regions, but reflecting in their larger figures their close proximity to the teeming industrial centers of South Wales and Lancaster respectively. In France the most thinly settled Departments are Basses-Alpes with 43 to the square mile and Hautes-Alpes with 50, which again owe even these figures in part to their situation on the margin of the densely populated valley of the middle Rhone. Norway, almost wholly a mountain country, averages only 15 souls to the square mile. Less than a thousand square miles of its territory are under cultivation, and these are distributed in small deltas at the heads of the fiords, in low strips here and there along its western coasts, or in plains at the openings of its mountain valleys to the south-east. Here too is massed the larger part of its inhabitants. A barren granite soil, unfavorable zonal location, excessive rainfall, paucity of level land, leaving the "upright farm" predominant, and remoteness from any thickly settled areas, together with the resulting enormous emigration, have combined to keep down Norway's population.

If we turn to Switzerland, a country poor in the resources of its land but rich in the resourcefulness of its people, we find a high average density, 205 to the square mile; but this is due to the surprising industrial development of the marginal plains, which show in the Canton of Geneva 1200 to the square mile, and in Canton Zurich 640, while the rugged upland of Graubünden (Grisons) shows only 38 to the square mile, Uri only 46, and Wallis (Valais) only 56. How limited is the food supply of the country is evident from the fact that only 2,400 square miles, or fifteen per cent. of its area, can be ranked as arable land fit for garden, orchard or grain field, while a larger proportion, or twenty-eight per cent., is made wholly useless by watercourses, glaciers, rock and detritus. One-half of the entire country lies above the region where agriculture is possible; so that 3,066 square miles, or one-fourth of the area rated as productive, can be used only as pasture land, and another fourth, or 2,700 square miles, is meadow land yielding only hay.

These figures tell of the hard conditions of life characteristic of most mountain regions. Population under normal circumstances tends to settle in the productive lowlands at the foot of the ranges and along the borders of its drainage stream. Soon, however, the food supply becomes inadequate for the growing numbers, so that artificial means have to be employed to expand the area of arable land. The soil on the mountain slopes is so thin that it yields only a scanty return to the labor of tillage. Moreover, under the operations of plowing and harrowing, it is exposed to the danger of washing, so that after a few croppings the underlying rock of the mountain side may be laid bare, and all that was valuable in the quondam field deposited in the valley as silt or swept away to enrich the distant delta of the nearest trunk river.

To obviate this difficulty and to secure the desired increase of arable land, mountain peoples the world over have resorted to terrace agriculture. This means hand-made fields. Parallel walls, one above the other, are constructed on horizontal lines across the face of the steep slopes, and the intervals between are filled with earth, carried thither in baskets on the peasants' backs. The soil must be constantly renewed and enriched by manure in the same way, and the masonry of the retaining walls must be kept in good repair. Wherever possible, these costly terraced fields, if in the northern hemisphere, are located by preference on southward facing slopes, where the tilt of the land makes the fields catch the rays of the sun almost at right angles and thus counteracts the chill of the higher altitude, while the mountain behind protects the growing crops from the cold northern winds. Good arable land, being so limited in amount, commands a high price; and especially do choice terraced fields in vine-growing countries, since they make the best vineyards. Such fields in Switzerland will bring from $1,500 to $2,000 an acre, and are estimated to produce two bottles of wine for every square foot.

Such terrace agriculture is very rare in new countries, like the United States and Canada, because here the level lands are still more than adequate to the needs of the people; but in the more densely populated Old World it is widely distributed in mountainous areas. In Germany, where it is nearly identical with the culture of the vine, it is found along the steep slopes overlooking the valley of the Moselle and the Rhine; also in the Vosges Mountains, the Black Forest, and the Swabian Jura to the limited altitude to which the vine will flourish in these northern regions. In the Alps it is wide-spread, and not confined to the culture of the vine. The traveler passing along the Upper Rhone through the sunny Canton of Valais, follows these terraced fields almost as far as Fiesch (altitude 3458 feet), beyond which agriculture proper becomes more and more restricted on account of the elevation, and passes rapidly into the mere hay-making of a pastoral community. Between Leuk and Sierre not only the mountain sides but also the steep gravel hills constituting the old terminal moraine deposited by the receding Rhone glacier across the valley floor, are terraced to their very tops.

Terrace cultivation prevails in the mountains of Italy; it is utilized not only for the vine, but for olives, maize, oats, hemp, rye and flax. On the gentler declivities of the Apennines, the terraced walls are wider apart and lower than on the steep slopes of the Ligurian Alps along the Riviera or the ridges of Amalfi. This careful terrace cultivation, involving an immense expenditure of labor, has produced in Italy a class of superior gardeners. The Genoese are known all over their country for their skill in this sort of culture and so are the men from the mountain-walled plateau of the Abruzzi.

Turning further east, we find this kind of agriculture widely distributed in the Himalayan lands. In the Vale of Kashmir the steep mountain sides are cultivated thus to a considerable height. The terraces are irrigated by artificial canals bringing the water for miles and miles along the hillsides from some distant glacier-fed stream, and support groves of peach, apricot, walnut, almond, flourishing vineyards and fields of grain. The mountain section of the native state of Nepal, also, presents the view of slopes cut into gigantic stairs, each step a field of waving rice kept saturated by irrigating streams from mountain springs; and the terraced slopes about the hill station of Simla help feed the summer population of English who there take refuge from the deadly heat of the plains. Yet farther north, terraced agriculture combined with irrigation is to be seen in the high Gilgit valleys, where Himalayas and Hindu Kush meet; and farther still along that mere scratch in the upheaved mass running down from the high Pamirs, called the Hunza Valley. Here live the once lawless robber tribes of the Hunzas and Nágaris, whose conquest cost the British a dangerous and expensive campaign in 1892, but whose extensive terraces of irrigated fields and evidences of skilful tillage give the whole country an appearance of civilization strangely at variance with the almost savage characters of its inhabitants. Yet farther in the wilds of the Central Asiatic highlands near the sources of the Sutlej and Indus rivers in Ladak or Western Tibet, this same form of cultivation is practised by the retarded or degraded Mongolian inhabitants. Here at an altitude of 11,000 feet or more, along mountain ranges of primitive rock yielding only a scant and sterile soil, terraces are laboriously constructed and manured with the burnt remains of animal excrements, which must first serve as fuel in this timberless land before they serve to fertilize the ground. In this stronghold of Buddhism almost every lamasery has its terraced fields, yielding abundant crops of grain and fruit.

All mountain agriculture must be laborious. The paucity of arable land precludes the possibility of letting fields lie fallow. Hence to prevent exhaustion these must be constantly and abundantly fertilized, all the more as conditions of excessive subaerial denudation in the present, as well as possible glacial scouring of the land in the past, have greatly attenuated the layer of soil called upon to support plant life. The Swiss or Tyrolese mountain farmer cherishes his manure pile as at once the source and badge of his wealth. At the end of the harvest, it is carted or carried in baskets not only to the terraces, but also to the wide alluvial fan that grows his oats and rye, and to the narrow plain along the river,—to vineyards, grain-fields, and meadows.

All mountain farming therefore finds an important ally in stock-raising; this, however, in higher altitudes restricting greatly the range of cereal products, becomes the dominant interest of the inhabitants, while agriculture takes the subordinate place and is limited merely to the growing of hay and fodder for the winter feeding of the stock. Above the line of tree-growth flourish the natural summer pastures up to the limit of perpetual snow; and just below lies a zone, which, if cleared of its forests, supports a thick carpet of grass and herbage, though too cold to ripen grain.

Hence stock-raising tends to prevail in all high mountain regions. It involves a nomadic existence for those of the inhabitants who act as herdsmen, for in the spring, as soon as the upland pastures begin to grow green, the cattle, sheep and goats ascend step by step in the wake of Summer as she climbs the slopes, and return only in the fall to the villages. There they feed on the stubble of hay and grain-fields, till the rapidly increasing cold confines them in their low warm stables. These upland pastures have remained communal property, whether in Norway, Switzerland, Bavaria, Alpine Italy, Nepal or Kashmir, because to divide them is not practicable. In Europe their use is regulated. As a rule a villager may keep on the *Allmende* during the summer as many head of cattle as he is able to stall-feed during the winter; any in excess of this number must be paid for at a fixed rate to the village or communal treasury. Hay-sheds and cow-herds' or shepherds' huts mark these districts of temporary occupation in the highlands of Europe; and similarly in Asia are to be found small villages, inhabited only in summer by herdsmen tending their flocks, like the hamlet of Minamerg at the southern foot of the Borzil Pass over the Western Himalayan range, and Sonamerg (altitude 8,650 feet), at the foot of the Zoji-La Pass, both of them on the northern rim of the Vale of Kashmir.

But while one portion of the population is away tending the flocks and herds on the heights, the rest are busy at home securing grain and fodder for the winter feeding. This includes the cultivation of hardy crops like oats, rye and barley, which will mature at a great altitude; hay-making, and collecting bunches of twigs and even leaves for the less fastidious goats. In mountain regions of heavy rainfall, thick dew, and numerous cloudy days, it becomes a problem to get the hay dried and stored before a drenching shower comes. In many upland parts of Switzerland, therefore, the peasant on a clear morning cuts a limited amount of grass. This, with the help of his wife and children, he diligently turns and tosses at short intervals all day long, thus subjecting it to a rapid curing process by the action of the wind and the sun, whose rays are doubly effective in the rarified air of the heights. In the evening the hay is made up into bundles and carried on his back to the barn. In other parts of Switzerland the green hay is hung on horizontal poles arranged against the sunny side of the chalet and under its projecting roof, thus exposed to the heat and protected from the rain till cured. In Norway the same purpose is achieved by setting up in the fields racks supporting long horizontal bars, over which the newly cut grass is hung. There it is exposed to the gentle fanning of the wind and penetrated by the warmth of the sun in the short intervals when the sky is not overcast; and during a shower it sheds the water immediately, so that a minimum of harm is done. In the mountains of Germany the hay is stacked on cone-shaped racks made of poles with lateral projections which support the grass, so that the air can circulate freely inside the hollow cone, which is lifted well above the ground. Elsewhere sharpened stakes provided with cross bars are simply driven into the ground and on these the hay is draped till cured. Mountain haymaking leaves nothing to chance; too much depends upon the crop.

It is not necessary to indicate in detail the geographical distribution of the stock-raising industry among mountain peoples, because it is almost universal. Nor have we space to discuss here the manufacture of dairy products, which is the natural concomitant of this industry, and which yields some of the chief articles of export contributed by the economic mountain peoples to the commerce of the world.

Let us pass rather to some of the more indirect results of geographic conditions in these highland regions. The obvious and persistent fact of mountain economy is the limited amount of food secured even by the most intelligent and untiring labor. In consequence, the natural increase of population presses constantly upon the limits of subsistence and the pressure is relieved only by emigration. Sometimes this is only seasonal; it takes place in the late fall after the summer work is over, and is due to the restricted industries possible in the mountain during the winter. It seems to be a recurrence of that nomadic note in the *motif* of mountain life,—that wandering in the summer upward to the borders of the snow, in winter downward to the sun-warmed plains. In the fall the Swiss come down to the cities in large numbers, seeking positions as servants or pastry-cooks. From the Basilicata Apennines of Southern Italy, from the mountains behind Modena and the mountainous Sorrento peninsula, the younger men go out to follow the peddler's trade, but they always return at the appointed time. Periodically many of the mountaineers of the Italian Alps migrate to the neighboring towns in search of work. Men from the Abruzzi become gardeners in the lowlands.

More often, however, permanent emigration is the result. Piedmontese, Fruilians and Bergamese from the Italian Alps leave their country in large numbers, many of them to find work in Marseilles and the other towns of southern France. Since small wages suffice for their frugal wants, they can under-bid the Frenchman in the labor market. The Norwegians have gone in immense numbers to the United States, and Scotchmen of Highland birth are found scattered over the whole world. In 1903 Switzerland saw over five thousand of its people cross the ocean to America.

The less civilized mountain races, whose tastes or low economic status unfit them for emigration, solve the problem of an insufficient food supply by raiding their neighbors. The Kurds from the highlands of Asia Minor systematically descend to plunder or blackmail the inhabitants of the more fertile plains of Armenia. Muscovite dominion was extended over the Caucasus initially because of the persistent raids of its tribes into the plains of Southern Russia. Similarly the British in India have had to check the depredations of the Pathans from the Sulâiman mountains and hill tribes from the Himalayas. Their last struggle was with the Hunzas. In spite of the careful cultivation practised by these people, their country was much over populated. The supply of grain was so inadequate that during the summer the people subsisted wholly on fruit, in order to reserve all the grain harvest for winter use. Therefore, when the passes over the Karakoram and Himalaya ranges were open in the spring and caravans began to move over the old established trade route between Kashmir and Yarkand,—when the Khirgiz nomads from the plains sought the pastures on the heights with their flocks and herds, the Hunza tribesmen found raiding on caravans and herds the easiest means of supplementing their slender resources. Hardy mountaineers as they were, and born fighters, they always conducted their expeditions successfully, and returned to the shelter of their fastnesses, laden with plunder and driving their captured flocks before them.

Those mountain people, on the other hand, who have attained a higher economic status and who relieve the pressure of population by emigration, are characterized by habits of industry and frugality which insure their success when they seek their fortunes in the new and generous lands of the western world.

MOZAMBIQUE

North of the equator is a region of alternate currents, which change about a month after the change of the winds, running six months this way and six months that. These have long had, as Von Luschan, the eminent ethnologist of Berlin, told me, a great influence in carrying the higher arts from India to mix with the lower arts of Africa. The same currents had much to do with the early establishment of trade between the two countries, oversea traffic with favoring winds and waters being here much easier than traffic over desert lands.—W. M. Davis in *Boston Evening Transcript.*

COMMERCIAL GEOGRAPHY FOR SECONDARY SCHOOLS

BY J. PAUL GOODE,
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COMMERCIAL Geography is one of the youngest claimants for attention in the school curriculum. It is a great field well and widely recognized but, at least in America, it is essentially unorganized. Commerce is old, older than recorded history, and geography is some generations old; but Commercial Geography, with us, is not yet fairly above the horizon. In our secondary schools the subjects that are well presented are those in which the teacher has an opportunity to get well grounded in the college and university. This accounts very largely for the strong hold which Latin has still in our schools. Some of the older of us can remember how the sciences began to come into the high schools, and the sciences have gained a foothold in these schools just in proportion as they have been well established in the universities. In the matter of geography they fare better in Europe than we do. College work along the lines of commercial geography is offered in nearly every German speaking university and in all of the technical high schools—over a hundred places. In most of the French and Italian universities, too, nearly a hundred more, yet the subject is represented in barely a dozen English speaking universities. Truly there is some excuse for a lack of organization of the subject with us.

In the scope of Commercial Geography as we have it presented, there are two well defined points of view; the commodity, and the country. Difficulties begin in trying to limit the field. What shall be said about commodities? What *is* the geography of commodities? There are some things we may all agree upon: Areal distribution is geographic; so is the location of commercial centers; so are the routes of trade and most of the conditions determining these routes. But how about processes? Are they geographic? How far should they enter? We must pass judgment upon processes, according to whether they have a geographic bearing. Take the case of lumber. Why is the lumber so nearly stripped from the Great Lakes region, while a considerable resource, enough to last fifty or sixty years, still remains in the South? The answer is found largely in the processes by which the lumber is won. In the north when winter comes, rivers, swamps and lakes are frozen and become ideally perfect roads, making it possible to go anywhere with teams, and to draw extremely large loads with ease. On the contrary, in the South the seasons offer no advantages. There are no roads anywhere, unless they are specially built,—an extremely expensive undertaking and even so the roadway is inferior in every way to the frozen river of the north. So, loads are small and lumbering is expensive.

Or, take the case of cotton manufacture. Why does starvation loom before the textile workers of Lancashire? Why is English textile supremacy threatened? Why did the King in a recent message to Parliament, dwell so earnestly upon the need of testing in every available colony, whether cotton might not be grown there with profit? The answer is not to be found in any change in climate; nor in the question of fuel for power; nor in the facilities or efficiency of transportation; nor directly in any change in the labor conditions in England. The answer lies in the invention of the ring spinning machine. This machine makes it possible in all coarser spinning to substitute for the highly skilled mule spinner, a six-year-old 'pore white' child in our southern states, and the three cent labor of women and children in India and China. Thus the revolution is on, and the cotton instead of going to Manchester to be spun, is made into cloth in the region where it is grown, and woe settles down over Lancashire. The method of spinning a thread on the ring machine has nothing of geography in it, but its influence becomes geographic in a very real way, as truly as a variation in precipitation or an untimely frost.

In the next place, how far shall we go in the treatment of a country? For an elementary course of a year, I am ready to say we may omit the country entirely. The ill logic of the political unit in geography is impressive, once it is challenged. It is true, statistics are national, more is the pity. But trade is *inter-regional.* And the conditions of production and transportation are mostly physiographic. Cotton grows best not under a monarchy, or for Germans or Americans, but in tropic or sub-tropic temperatures, with seven months at least free from frost, with the proper mixture of sun and rain, and with good transportation facilities between the plantation and the loom, and between the loom and the consumer. Forests grow with given temperatures and with certain annual and seasonal rain distribution, regardless of courts or parliaments. Animals thrive plentifully or sparsely according to the vegetable food supply, without regard to fiat or injunction. In short, in all the geography of the schools the State is of the least importance, and for most of the educative part of school work could be nearly ignored. The drill on the purely political and little else is a survival, like the vermiform appendix, or like the buttons on our coat sleeves. Nevertheless the region is a logical unity for detailed study, and even the country, at least the home country, will serve admirably as a unit for advanced work. All authors, so far, vacillate between these two points of view: Commodity—country. But with all respect to Mr. Chisholm and his followers, I believe the geographic element has been slighted in all this work, and we are over-taxing our pupils with mere dollars, and bushels and tons,—which is not education.

We can't do everything in one year. I firmly believe we are attempting too much. Suppose we give up the countries in our elementary course, and make the scope of the first year *Commerce and Commodities.* It makes a field big enough in all conscience. I would suggest the following:—

ANALYSIS OF AN ELEMENTARY COURSE.

I. *Commerce.*

1. Conditions controlling commerce:—The principles of trade; unequal endowment of regions, in advantage of position, in relief, minerals, soil, climate, the character of vegetation, industrial development, and standard of living of peoples.

Government interest:—Control of shipping, suppression of piracy, fixing of conditions in land transportation, tariffs, bounties, establishment of ports, the consular system, colonization, education.

Organization of industry:—Establishment of standards; weights, measures, time, money; establishment of the market, and the settling of accounts; organization and training of labor.

2. Means of transportation:—Conditions and forces of land transportation; of water transportation; function of water ways in fixing rates; character and significance of harbors; the logic of ocean routes.

Safeguards to life and property; elements of safety in land transportation; charting the coasts and seas; light houses; storm warnings; life saving service; quarantine; inspection; insurance.

3. Means of communication:—Society as an organism; the postal system; the parcels post; ocean cables; the telegraph; the telephone; wireless transmission.

4. Commercial tendencies:—From luxuries to necessaries; the equalizing of prices and supplies; the territorial division of labor. Movement of population:—to cities; winning the tropics. Educational tendencies.

II. *Commodities.*

1. The products of mines, quarries and wells:—Coal, iron, gold, stone, water, etc.

2. The products of hunting and fishing:—Furs, ivory, game, fish.

3. The forest resources:—Lumber, fuel, gums and resins, fruits, textiles, dyes, drugs, etc.

4. The significance of the soil:—Origin, translation, drainage, irrigation, maintenance of fertility.

5. Products of the farm, orchard and range:—Cereals, roots, fruits, textiles, domesticated animals and their products.

6. Manufactures:—Foods, clothing, shelter; arts; machinery, etc.

7. The forces employed in manufacture and transportation:—the muscles of man and beast; wood and coal for steam; water power; other sources of power.

Part I of this analysis is not adequately presented anywhere. It is almost impossible to get our questions answered in some of these topics, and yet they are educative in a very high degree.

The subject thus outlined is a very large field. We cannot go much into detail in all these topics, and we do not need to. "One need not eat the whole pudding to know how it tastes." Out of the long list of topics we may choose some as types, and treat them fully; coal, the forest, corn, cotton, etc. Go fully into the physical factors involved in production and distribution and in the journey of the product to manufacturer and to market, regardless of political boundaries, and with an eye always to the way in which the industry reacts upon the people,—producer, carrier, consumer. For the human element is the substance of a permanent and universal interest. It is dominant in commercial geography, a proper study of which lays a foundation for the serious study of sociology, and for the solution of many social problems.

To present the study properly we need to take for granted: (1) The simple geography of location; the knowledge of the map; the form, size and space relations of the continents. (2) Elementary physiography, with its knowledge of the evolution of earth forms, and (3) a much more adequate knowledge than is at present given of the elements of meteorology and climatology,—the circulations of air and sea, and their significance in climate.

In presenting the subject the prime requisite is, of course, the teacher, and the character of his preparation needs to be carefully looked after. He must have wide interests and an insatiable appetite. He ought to approach his subject through the natural sciences. He needs to be well grounded in geology and physiography, and to have had special work in climatology. In biology, too, he ought to have had special training; in botany something more than the names of species, valuable as this may be; he needs all he can get of ecology. He must be able to trace with considerable accuracy the intimate dependence of organ and function upon the varying conditions of light, heat, moisture and soil; in zoology, too, he ought to have a familiar acquaintance with a type form in each of the great phyla, and to know at first hand how changes in the elements of the physical environment invite changes in the organism, and that man is no exception to the rule. These natural sciences are fundamental to an adequate study of man and his institutions, and elementary courses, at least in economics and sociology, should follow as a part of the teacher's necessary equipment. Add to this a comprehensive training in general history and a reading knowledge of French and German, and we have the main lines of a liberal education, as well as a very excellent preparation for a specialization in commercial geography. It would be well if in vacations and the interim of the mastery of many books, the youth has had a chance to get some experience in the actual mechanics of some of the trades. To have earned his bread by the sweat of his brow on the farm, or in the mine, or foundry, or mill,—this is a training worth more as a part of real preparation, than all the frills of an ordinary education. For if he knows *work* and the condition and horizon of the worker, it will prove a source of endless interest and profit.

His power as a teacher will lie largely in an ability to inspire thought. This he may do by a logical presentation of the factors involved, with the causal relations always in view. The 'why' questions must be constantly in evidence and the nimbler he is in tracing effects back to causes, the better.

The next requisite is a text. By all means have a text. It saves work and worry. At the least it is a convenient reference book of facts. In several cases at present it is little else. Chisholm is the pioneer of all the English texts, and he remains the best of them all. He covers all commodities, and all countries, too, to 700 pages of closely printed octavo. All our American texts are fashioned after Chisholm, and our best school text was not even written by a teacher. They all attempt to mention all the things and places Chisholm does, and get it into a duodecimo book of 350 pages. Such condensation is dangerous. It comes to be a dictionary of statistics and of more or less unrelated facts. Its study is likely to cause mental indigestion. In its extreme condensation it is not education, and largely not geography. For let us not forget that education does not consist in memorizing statistics, nor in counting catalogues of things, any more than in memorizing capes and lists of cities. Education is achieved in the power of thinking; in the ability to trace effects back to causes; in finding out the why of things. And there is no subject more full of problems to be solved, than is commercial geography:—What has the position of the world's great highlands to do with the commercial supremacy of the Atlantic? What geographic handicaps have Boston and Philadelphia in commercial competition with New York? What is the effect of the Great Lakes and Erie Canal in fixing railway freight rates in America? What is the dominant factor in England's commercial power? What great social advantages are there in agriculture by irrigation? What can plant breeding do to increase the world's wealth? What part has cotton played in fixing social status and political attitude in the South? What is the economic significance of the discovery that the mosquito is the immediate cause of the spread of malaria and yellow fever? What industrial revolution is coming as coal grows scarce and dear? What powerful political and social influence grows out of the fact that England produces only seven per cent. of the bread she eats?

There are thousands of these questions. They meet us at every turn. They can not all be solved. But they can be opened up. We can, at least, begin to think along these lines.

These and kindred questions invite research, and send teacher and student to the library. And to become independent in the use of books and printed material generally, is one of the best things a student may learn. The work can be taken up topic by topic, and teacher and class may bring to the recitation contributions from a wide reading, special references being assigned to certain students to be reported on. Then each should have at least one topic per term upon which he may acquire a wide margin and an 'easy mind,'—a taste in real research. His written report on this is the best kind of exercise in English composition, and is better than an examination as a measure of the real power of the student. This also puts the library to the test and brings up out of the dust a wealth of material otherwise untouched. Not until such a subject comes along do we begin to realize the extent and value of our government publications. No other government is doing so large a service in scientific advance in productive lines, as our government is undertaking. In the Department of Agriculture alone over sixty serial publications are issued, nearly all of which are grist for our mill. So too the Department of the Interior, and of Commerce and Labor, to mention only two others, are issuing an enormous amount of very valuable matter for our work. And most of these publications may be on the shelves of each school, as issued, if the teacher is alive to his opportunities.

A very valuable adjunct to the text and to the presentation is a generous list of maps and graphs. And it is no disadvantage that for the most part graphs have to be made as used. Their best use is in showing a trend or tendency, or in making direct comparisons. Thus the increase in output of a commodity through a term of years, or the direct comparison of one region with another, in production, or of one commodity as compared with another, is shown to the eye at a glance, and in a way to be remembered. The graph is the 'short-hand' of statistics, and with the map is one of the teacher's strongest appliances. The number of side lights that can in this illustrative way be brought to bear upon a topic is surprising. For example, studying corn in the United States: We want maps showing the distribution of glacial soil; of highlands and lowlands; of the annual rainfall; a graph of rain distribution by months in the growing season in the central region of maximum production; maps showing a sequence of cyclones and the way the rain is drawn in from the Gulf and the Atlantic; charts of the earliest and latest killing frosts; a graph of season length free from frosts; a map of corn production per square mile, in at least two tints to bring out the region of maximum production; map of corn production per acre; graph of corn production through the century with the other cereals in comparison; map of hogs per square mile; map of cattle per square mile; map showing location and magnitude of the great packing centers, of the dairy center, and of the distillery centers. These maps and graphs can easily be converted into lantern slides and made available for use before the whole class. In fact, with a lantern any fine map in atlas or book may be converted into a large wall map, in color, for about a dollar, and one could carry a hundred such maps in his hands at once. Thrown on the screen, all the class may be studying the one map at the same time and the recitation may be going on from the map. With the lantern also there is a world of illustrative material available in the way of photographs. The possibilities of the lantern in instruction are very great, and, I fear, not yet appreciated. I am glad to call attention to the splendid work the Keystone View Co., of Meadville, Pa., is doing in this connection. They have the services of highly skilled and competent men, who are making a careful study of the great industries, photographing processes at every critical step, and issuing a series of illustrations both in stereoscopic form and as lantern slides, each view accompanied with a short explanation or description. All teachers of geography in all grades will be glad to know of this work.

The actual material of the commodity in its various stages of preparation or manufacture has a high teaching value, and a museum is an ideal adjunct to the library. For example, the silk moth, the cocoon, and silk, raw, spun, reeled, woven and dyed. Or petroleum, raw, and its various products from benzine to axle grease, and from patent medicines to chewing gum. Or corn, the stalk, husk, and ear, and its products from meal and pone to starch, table syrup and whiskey, or from husk mats to parchment paper and smokeless powder. Or again, the actual rubber from sap to vulcanite. The list is almost endless, and it is not difficult to start the museum. Manufacturers are often good natured, and glad to co-operate. But I should not advise any school or teacher to accumulate material without dust proof and locked cases to protect it. Waiting for cases, however, would bar most schools at present from having materials to use, and it is very gratifying to know that beginnings are already made in series of traveling museum collections, which have been provided in Chicago by a Museum Association, and in Philadelphia by the Commercial Museums. These collections are available at little or no expense to the school, and one collection may visit thirty or forty schools in the course of the year. This is an excellent work, and well worthy of finding favor in many other places.

Next to the museum is the excursion. To visit the factory or the mine, and actually see the work in progress, and the workers under normal conditions of production, is an education in itself. This is most valuable when following the topic which the work illustrates. Thus, following the study of iron, a visit to the rolling mill or foundry clinches the study as nothing else can. An itinerary may be provided beforehand calling attention to the things and processes to be seen, for people usually see what they are looking for. A written report after the excursion will add much of value, and will be helpful as an incentive to careful observation.

The subject of Commercial Geography properly presented stands as a logical connecting link between physiography and biology on the one hand, and history, economics and sociology on the other. The student properly trained in it will have his eyes open to a multitude of the great problems of modern society and will be well started in a way to know the forces involved and the method of solution of these problems. Above all he will be impressed with the idea that things do not happen,— they are caused, and that even social and economic problems may be solved by study and thought.

TEST PROBLEMS ON DAYLIGHT AND DARKNESS

Do the following passages bear any traces of the latitude, season, or country in which they were written?

"Twilight and evening bell,
And soon after the dark!"

"The sun's rim dips; the stars rush out:
At one stride comes the dark."

"The night cometh, when no man can work."

"The long gray fields at night."

"The dawn comes up like thunder."

From *Simmon's and Richardson's Introduction to Practical Geography.*

SUGGESTIONS FOR THE TEACHING OF GEOGRAPHY IN THE UPPER GRADES

BY W. C. RUEDIGER

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THE study of geography in the elementary school is quite uniformly shaping itself into the form of a double 'spiral,' preceded by a somewhat detailed consideration of the home environment. This gives us (1) home geography, which is beginning to take on a definite form and to receive attention proportionate to its importance; (2) the first spiral, represented by the elementary text-book; and (3) the second spiral, represented by the larger or Grammar School Geography. A fair division of time places the home geography in the 3A and 4B grades, the elementary book in the 4A, 5B and 5A grades and begins the larger book in the sixth grade.

Although these three divisions of the work all conspire to give the pupil a knowledge of the earth's surface in its relation to man, they nevertheless differ quite widely in subject matter, aims, and methods of treatment. The method in home geography is almost entirely inductive. The pupil is led to study his environment first hand in order to gain a knowledge of and a mastery over it, and to accumulate a stock of concepts by means of which he may later interpret the geography of regions remote from home. Much that might be classed as 'nature study' forms a part of this work, and geography and nature study should not at this time be treated in separate classes.

In the study of the elementary book the pupil is given his first general view of the world. The concepts gained in home geography are drawn upon and applied. Description is a leading characteristic here and the teacher should constantly aim to make the work concrete and realistic. Much use should be made of pictures, and the pupils should be given vivid mental pictures of every region studied. The details of agriculture, lumbering, mining, and other industries should be brought out and made meaningful.

The distinctive feature of the second spiral in geography is the greater stress that is laid on the tracing of causal relations. While this feature is not omitted from the preceding work, it is nevertheless given a subordinate place; and on the other hand, the study of *facts* as such is by no means eliminated in the advanced work. An accurate knowledge of facts is a prime requisite in the deductive process, for only in the degree that we have this knowledge can we draw correct conclusions. From a knowledge of the position, size, contour, surface features, and prevailing winds the pupil is led to infer what the climate, productions, and chief industries of the country should be. Approached in this way geography becomes a science, and the knowledge gained is rational and integrated, informing one not only of the facts, but also of the reason underlying the facts. Knowledge of this kind is more easily retained and gives one a sense of mastery over the subject-matter.

MATHEMATICAL AND PHYSICAL GEOGRAPHY: In order to gain an organized knowledge of geography, it is necessary that the pupils have at their command some of the leading facts and principles of mathematical and physical geography. These form the basis of all scientific geography, and a knowledge of them must be presupposed if the subject is to be understood from the bottom up. Ultimately not only the plant and animal life of the globe, but all the activities of man are regulated by them. Without a knowledge of these principles on the part of the class, a country could not be studied in the deductive manner above indicated. There is, therefore, ample justification for devoting perhaps a half year at the beginning of the larger book to the study of the fundamental facts and principles of mathematical and physical geography.

Owing to the immaturity of the pupils, the teacher must content himself with a somewhat elementary treatment of these subjects at this time. Some parts may profitably be left over for the review in the eighth grade or for the high school. But if the topics are carefully and logically presented in an inductive way by means of a globe and simple illustrations and experiments, even a sixth grade class will go far in understanding them. What is needed first of all is a clear and thorough knowledge of these things by the teacher. Many of the facts of mathematical geography may be presented to the class as problems to be discovered from the globe, and if this is ingeniously done comprehension is almost assured. As a problem to be so discovered may be mentioned the position of the tropics and polar circles; what locates them just where they are?

In the fifth and sixth grades the pupils are easily interested in the solar system and the constellations, and an elementary knowledge of these may be presented. The motions of the earth, or rather, the apparent motions of the heavens due to the motions of the earth, can be observed only when some of the constellations are known. The conception of the earth as a body floating in space seems to be hard for many people to grasp. The idea that it floats in the air must be guarded against. The child is greatly aided in getting the right conception by seeing the earth in its relation to the other planets,—a relation that is easily diagrammed. Furthermore, it is only as he sees the earth in space that the pupil can fully grasp the conceptions of 'up' and 'down,' without which he can never realize that the people on the other side of the earth walk with their feet down just as we do. It becomes apparent that the directions up and down are purely relative to the earth and do not exist in space.

There is one thing, however, that the teachers in the upper grades should never forget and that is this: The pupils' knowledge of the principles brought out in the first part of the larger book should be *used*. These principles should be used in connection with every continent, and nearly every country studied. Only in this way can a thorough knowledge of the general climatic conditions, and all that results therefrom, be gained. Whenever necessary the teacher should go back to the globe and to a review of the winds, rainfall, and ocean currents. When this is systematically done the pupils soon gain a mastery of the principles in hand, and the causes for the existence of deserts in certain regions, for the wet and dry seasons of California, Oregon and Washington, and other problems of that nature, will not form stumbling blocks to them.

The following is a suggestive outline to be used as a basis of study. It is in a few respects too comprehensive for the sixth grade, and the topics that are omitted here may be included in the final review. When an outline like this is used, the text-book should be made subordinate to it. That is, the work should be given according to the outline and the text used as a reference book. This will afford an easy opportunity to use several standard texts in the class. In general, every topic should be developed by the teacher before any text-book study on it is assigned.

OUTLINE: 1. Where is the earth?

(Bring out the conception that the earth is a body floating in space, unsupported. It does not float in the air, but the air is a part of the earth.)

2. Meaning of "up" and "down."

3. Other planets and solar system.

(Lead the children to look up the visible planets in the sky. If possible, point out some of the constellations for the children, especially those in the zodiac and those about the north pole.)

4. Shape of the earth.

(Bring out from five to ten proofs that the earth is a sphere and make sure that each is understood. Demonstrate to the class mathematically that the roughness caused by mountains is inconsiderable.)

5. Is the earth a perfect sphere?

Reasons for believing that it is flattened at the poles are:

a. Measurement.

b. Weight increases toward poles.
c. Flattening must result from rotation.
d. Other planets are flattened at poles.

6. Size of the earth.
(Diameter approximately 8,000, circumference 25,000 miles. Make these numbers meaningful by means of problems. How long would it take a train to go 25,000 at the rate of 30 miles an hour? etc.)

7. Motions of the earth. Rotation and revolution.
a. Rotation: What moves visibly?
Proofs of rotation:
Deflection of falling bodies.
Foucault's pendulum experiment.
Flattening at poles.
Daily motion of heavens.
b. Results of Rotation:
Unit of time,—day.
Axis, poles, and equator.
Cardinal points.
Longitude.
Standard time.
International date line.
c. Revolution: What moves visibly?
Proof: The assumption that the earth revolves about the sun makes the mechanics of the solar system simple and conforms to the law of gravitation.
d. At this point bring out clearly the position of the earth in its orbit.
(1) Axis inclined 23½ degrees.
(2) Axis always parallel with itself.
e. Results of Revolution:
(1) *Year:* In connection with the length of the year the calendar should be taught. (The year is 365 days, 5 hours, 48 minutes, and 46 seconds in length.)
(2) *Seasons:* In teaching the cause of the seasons teach first the heating of the earth.
Why is it warmer at noon than in the morning or evening? Bring out two reasons distinctly, making them clear by means of diagrams:
(1) Rays cover smaller area at noon.
(2) Rays pass through less atmosphere.

Lead the class to see that these two factors apply in explaining the temperature difference between summer and winter, and that there is yet a third factor: There is much more sunshine in a day in summer than in winter.

Now let the pupils place the globe in position for spring, summer, fall, and winter, explaining every step. Lead them to see that three things—(1) inclination of axis, (2) parallelism of axis, and (3) revolution—are all necessary to produce the seasons.

(3) Latitude and Zones: Relate zones to seasons.

(1) Where do the sun's rays strike perpendicularly in summer, winter, spring, and autumn?

(2) How far north and how far south do the rays reach in each of these seasons?

(3) What, then, determines the boundaries of the zones? Are these boundaries artificial or natural divisions?

(4) Are the zones heat or light belts?

(5) Show how latitude naturally results from observation of distribution of sunlight at different times of year.

8. Climate and its relation to heat belts.

a. Climate:
  - A. Elements.
    - 1. Temperature.
    - 2. Moisture.
    - 3. Sunshine.
    - 4. Wind.
  - B. Determining factors.
    - 1. Latitude.
    - 2. Altitude.
    - 3. Winds and Ocean Currents.
    - 4. Proximity to Sea.
    - 5. Mountain Ranges.

Teach both A and B inductively.

b. Winds. Cause. (Use experiment.) Show relation to temperature.

(1) Trade winds. Direction. What determines direction?

(2) Belt of calms or doldrums; horse latitudes.

(3) Prevailing Westerlies.

(4) Monsoons.

(5) Land and sea breezes.

c. Rainfall. Causes. (Use experiments and familiar illustrations.) Give inductive lesson. Show relation to doldrums and mountain ranges. Study world distribution.

d. Ocean currents. Causes. Directions how determined?

THE STUDY OF A CONTINENT OR COUNTRY: The following outline may serve as a guide in studying a continent or country. Time and energy are saved when the teacher has a definite plan of procedure; but such a plan must not be allowed to crush out the individuality of the teacher, or to make the work monotonous. For this reason a plan should never be followed slavishly. Wholesome variety may be secured by judicious deviation from the outline, the guiding principle being the high points of interest in the subject-matter. Begin the study of a country with that feature which stands out most prominently. Such features are usually the result of surrounding conditions and hence make the logical as well as the psychological starting points. Italy may be approached through the historical and religious interest attaching to Rome, Spain through the characteristics of her people, Holland through the adverse conditions of life, and England through her advantageous position for commerce.

OUTLINE:

1. *Preparation.* Let us suppose that the continent to be studied is Asia. The first recitation can profitably be spent by talking with the class about Asia in general.
2. *Position.* As to latitude and longitude, in relation to the other continents. As to wind systems.
3. *Size and Extent.* Mostly in a comparative way, but the accurate determination by latitude and longitude is not to be neglected. This, as well as the area in square miles, may serve as bases for comparison, The size of the United States and that of the home state should be well known. To the east and west extensions the relation of longitude to time may be applied in comparison. For instance, the extreme east and west points of Asia are ten hours apart while similar points in the United States are but four hours apart.
4. *Surface.* Highlands and lowlands, mountain ranges, lakes, rivers, etc.
5. *Coast.* Regular or irregular?
   a. *Water forms.* Oceans, gulfs, seas, bays, straits, and channels.
   b. *Land forms.* Islands, capes, and peninsulas..

These topics appeal almost entirely to map study and should be accompanied by map drawing, the chief object of which is to teach form, size, and position. In map drawing the principle of going from the indefinite to the definite may be applied. Begin with a rough and quick free-hand drawing, or even with straight lines representing the general shape of the continent, and proceed gradually to more and more definiteness, ending with a somewhat finished map showing latitude and longitude. As guiding lines in the more accurate maps the lines of latitude and longitude are better than artificial construction lines, for they teach position on the globe as well as act as guides. After the continent as a whole has been considered, and while the different countries are being studied, it will be of advantage to let each pupil make a progressive map.

6. Climate.
7. Industries.
8. Products.
9. Cities, routes of trade, etc.

The treatment of the last four topics should be essentially different from the first four. The distinguishing feature here should be logical deduction. The climate should be deduced from the position, ocean currents, prevailing winds, coast line, and surface features. What facts would give Europe the same climate as the United States or North America, and what facts would make the climate different? Productions may next be deduced from climate, position and coast and surface features; and the location of important cities and routes of trade mostly from surface features. After these things have been studied in this way they may be read up in the text and in reference books and discrepancies noted. In each case where the facts are found to be at variance with the deductions, the reasons for the disagreement should be determined if possible.

After a continent has been studied in this manner, the separate states or countries of that continent may be taken up according to the same outline; but the treatment may be much abridged in places. Climate, productions, and occupations are peculiar to physiographical rather than to political units. In these respects, therefore, political divisions may be most economically studied by noting their relation to continental regions.

In connection with the geographical work, the national song of a country should be learned, if possible, and before the country is left, a special 'day' may be set apart for it. We may have a Scotch day, a German day, a French day, or an English day, depending on the country under consideration. At that time the class may imagine itself transported to that country, and the literature, songs, customs, occupations, and scenery may be illustrated. Photographs, lantern slides, and stereoscopic views may be used to good advantage here.

THE STUDY OF A TRADE CENTER: St. Paul-Minneapolis as a type. (Adapted from McMurry's *Method of the Recitation.*)

1. *Preparation.* Where are these cities? What do you know about them? Why called Twin Cities? Why is Minneapolis sometimes called the 'flour city'? If history has been studied, recall Hennepin's

trip. Talk also in a general way about the wheat fields and prairies.

2. *Location.* Why two cities? Bring out the fact that St. Paul was located at the head of navigation on the Mississippi before the time of the railroads, and that after the railroad simplified the problem of transportation, a city could be started where it could take advantage of the water-power afforded by the falls of St. Anthony, thus giving rise to two cities near together. Organically, of course, these cities are but one trade center.
3. *Water power.* Of what use is the water power? This question leads naturally to the consideration of the saw-mills and flour-mills, and thence to lumbering and agriculture, both of which may be studied in detail. The guiding conception in the teacher's mind should be to trace cause and effect and to build up in the minds of the pupils a picture of the leading activities of that region. Much help may be derived here from pictures found in geographies, railroad folders, current magazines, etc.
4. *Lumbering.* A detailed consideration may include the pine forest, cutting and sawing the timber, the lumber camp, swamping or loading on cars, the drive, rafting, the saw-mill, and the transportation of logs and lumber down the Mississippi by means of steamboats. Planing mills, making sash, doors, mouldings, etc., may be considered i connection with saw-mills.

   What becomes of the lumber finished at St. Paul and Minneapolis? Some is used in the cities, but most is shipped to the prairies lying to the west, southwest, and northwest, where it is used in the smaller towns and by the farmers. It is now transported mostly by means of the railroads, which, on their return trips, bring back train loads of wheat to be made into flour in the big mills at Minneapolis. In this connection the function and importance of a railroad in developing a country may be brought out.
5. *Agriculture.* Next in order should be a somewhat detailed consideration of agriculture. This might include the preparation of the soil, seeding, harvesting, thrashing, elevators, transportation, and milling. The farmers are enabled to pay for their lumber, farm-machinery, etc., by means of their crops.

   What is done with the flour? Much is shipped to Hamburg and Liverpool via the Great Lakes and New York, and more to the central states via Chicago. This may lead to a consideration of trade routes and their relation to production, population, and physical features.
6. *Other industries.* What other industries would naturally spring up

at St. Paul and Minneapolis as the surrounding country developed?

a. Manufacturing:—Furniture, Wagons, farm implements, barrels, etc.

b. The cities would become a wholesale distributing center for dry goods, groceries, machinery, drugs, china ware, books, etc.

7. *Other cities.* Before leaving this section of the United States, Duluth and West Superior, and a number of cities along the upper Mississippi may be briefly studied. An imaginary trip may be taken down the river.

An outline like the above should be made to serve a larger purpose than the mere study of a trade center. An entire country should be reviewed in sections by means of it, after it has been studied as prescribed by the text-book. The entire United States might be reviewed about such centers as New York, Boston, and Philadelphia in the east, Charleston and New Orleans in the south, Chicago, St. Louis, and St. Paul-Minneapolis in the middle west, Denver and Butte in the mountain and mining region, and Seattle, Portland, and San Francisco on the Pacific coast.

APPARATUS AND COLLECTIONS: Practically all the geography outside of the home environment must be taught by the indirect method. For obvious reasons the class cannot deal directly with distant regions, but must depend on secondary sources of information. This fact, perhaps more than any other, makes geography the most difficult subject to teach satisfactorily in the elementary curriculum. In language, reading, spelling, arithmetic, and elementary science the object of study is dealt with more or less directly by the class, so that first-hand interest is aroused; while in history, although dealing with its subject matter indirectly, we have mostly narration which is inherently easier for the mind to follow than static description. In geography, however, most of our material must be secured from such secondary sources as text-books and books of travel, which are largely descriptive, and from maps and pictures.

Recognizing these limitations, we see the necessity of resorting to such devices as will aid in bringing concreteness and directness to the work. Every school should have a museum of specimens from all parts of the globe, for illustrative material is needed in nearly all classes, and almost every day. But if the school is lacking in this respect, much may still be done by the teacher. There is much that he may have in the way of specimens and pictures in his private equipment. Besides maps and globes, which are indispensable, some or all of the following are within easy reach of the teacher.

1. *Pictures.*
   - a. Photographs.
   - b. Stereopticon views.
   - c. Stereoscopic views.
   - d. Views of the world (in book form).
   - e. Magazine and newspaper cuts.
   - f. Railroad folders and other advertising matter.
   - g. Illustrations from books.

Sets of pictures illustrating scenes, trades, and industries may be obtained at reasonable rates from the Nature Study Publishing Co., 521-531 Wabash Ave., Chicago, and many things of value may be obtained from the departments of the United States government. This material should be collected and preserved in a systematic way. So as to be easily accessible, it should be classified and indexed, the card catalogue system according to the alphabet being perhaps the most serviceable.

2. *Products and Specimens.*
   - a. The grains, as wheat, oats, etc.
   - b. The plants and seed-pods of these grains.
   - c. Wood of many kinds.
   - d. Leaves and branches of these woods.
   - e. Plants of cotton, tea, coffee, spices, etc.
   - f. Curios from different countries.
   - g. Rocks, soils, and minerals.

DEVICES AND SUGGESTIONS FOR REVIEW WORK: The ingenuity and resourcefulness of a teacher are nowhere more thoroughly exemplified than in a review exercise. No teaching exercise is more illuminating than a thoughtful review, while, on the other hand, no exercise is more stupefying than a review devoid of thought. In the review, the subject should, if possible, be approached from a standpoint different from that of the original presentation. The subject should be viewed in "new and unexpected ways, in new lights, in altered perspective, in fresh connections." (Chubb.) This insures continued interest, produces new lines of association, and leaves the knowledge in a more thoroughly integrated form. Cleverness at devices is no less essential in successful teaching than an intelligent review. They may be spoken of as the utensils of instruction. The following devices and suggestions may be used at the discretion of the teacher. Some of them will serve only as review exercises.

Mathematical geography may be reviewed and tested in topical recitations illustrated with the globe and drawings, and by means of problems embodying the principles of the earth's motions and position in space. The following may serve as illustrations:

Where are the days always equal? Why?

Under what conditions would there be no change of day and night? Illustrate with globe.

In the year 1904 the earth rotated 367 times. Why? Discover with the globe.

Where do growing crops receive more sunlight, in Florida or in Montana? Why?

Are the zones natural or artificial divisions?

What change would bring the Arctic Circle through your home?

Under what conditions would there be no temperate zones?

Many interesting problems suggest themselves in regard to latitude, longitude, time, and the 'date line.' (For further suggestions see Jackson's *Astronomical Geography* and Gillan's *Lessons in Mathematical Geography.*)

Dissected maps may occasionally be brought in to good purpose in reviewing and impressing form, size, position, and direction. Is the pupil able to recognize by their shape the different states and countries when presented out of their relation to the entire map? and can he place them in their proper positions on the map? Comparative areas may be impressed by bringing dissected countries constructed on the same scale in juxtaposition. Maps to be used in this manner may readily be made by the pupils. Let the map be carefully drawn first and then dissected.

As a map review of a continent or state, an outline map may be placed on the board and the class may be called upon to supply the names and details. The rivers, position of cities, boundary-lines, etc., may or may not appear in the outline, depending on the nature of the review. With some variation this may be made a geography game. Geography games, occasionally used and judiciously conducted, bring about excellent results in clearness of knowledge. They are almost sure to be accompanied by keen attention and vigorous thought.

To test the ability of logical inference, a detailed map of 'nowhere' may be placed upon the board and the class may be asked to infer the probable climate, productions, and industries, giving reasons for every statement. In examination, a map of this nature may serve as a test in map reading.

Questions like the following 'sprung' on a class occasionally have a good effect.

1. Which is larger? and how much larger? Cuba or Montana? Texas or Australia? Lake Superior or the Caspian Sea?

2. Name the largest state east of the Mississippi.

3. Which extends farther south, Africa or South America?

4. What foreign country would you reach in going due east from your home? In going due west?

5. Could you reach South America in going due south from your home? From Chicago? (In dealing with questions of size and direction, a globe is usually better than a map because maps are often much distorted toward the poles.)

Some aspects of geography may be treated to advantage in the language and arithmetic classes. This will do more than furnish material for these classes. It will direct attention to many things that would otherwise pass unnoticed, and by bringing the material into use, the knowledge will become more thoroughly organized.

The arithmetic class may deal with such topics as the population of states and cities, the areas of continents, states, and bodies of water, the output and navigability of rivers, exports and imports, and commerce in general; while in the language class may be treated the customs and manners of people, occasional imaginary journeys and descriptions, and the stories of agriculture, stock raising, lumbering, mining, etc.

BIBLIOGRAPHY: The following literature is recommended in the belief that books that broaden and deepen the teacher's knowledge in fields related to geography will do more for vital work in the class room than books on method. A more extended list may be found in Redway's *New Basis of Geography,* chapter XII.

Several text-books of geography, especially Frye, Redway and Hinman, Tarr and McMurry, and Dodge.

A set of geographical readers, especially Carpenter's.

A few good books of travel.

A text-book of physical geography, especially Davis' Elementary Physical Geography.

A text-book of commercial geography, as Adams' or Gannett, Garrison and Houston's.

A text-book of geology, as Brigham's.

A text-book of astronomy, as Comstock's or Bowen's.

Redway, *The New Basis of Geography,* Macmillan.

Fiske, *The Discovery of America,* Houghton, Mifflin & Co.

Geikie, *The Teaching of Geography,* Macmillan.

Redway, *The Reproduction of Geographic Forms,* Heath & Co.

Nichols, *Topics in Geography,* Heath & Co.

Russell, *Rivers of North America,* Putnam.

Jackson, *Astronomical Geography,* Heath & Co.

Gillan, *Mathematical Geography,* Gillan & Co., Milwaukee.

Teachers College Record, March, 1901. Devoted to geography in the Horace Mann Schools.

Valuable maps, charts, and data may be secured from departments of the United States government. The Coast Pilot Charts, Weather Bureau maps, and maps of the Geological Survey and the Coast and Goedetic Survey may be mentioned. A list of government maps suitable for school use may be found in *Government Maps for School Use,* Henry Holt & Co., New York.

The consular reports are rich in geographical information and are valuable for reference in the upper grades. The *Year Book of the Department of Agriculture* should be in every school library. These may be obtained free by application to your congressman.

Sets of pictures illustrating scenes, trades, and industries may be obtained from the Nature Study Publishing Co., 521-531 Wabash Ave., Chicago.

SOME NOTES ON SOUTH AFRICA

The botanists told us of the extraordinary richness of the South African flora; for example, of four hundred and twenty known species of heather in the world, four hundred are found in the southwest coast belt of Cape Colony, and three hundred are found on Cape Town peninsula, an area about equal to that of the Isle of Wight. The dry interior afforded many examples of plant adjustment to aridity: small leaves, covered with down or felted hairs, to reduce evaporation; quick growth of annual plants, which reach maturity in the short wet season and remain as seeds for the rest of the year; perennials which shrivel as if dead in the dry months, and become bright and green after a few hours of rain: a double set of roots, the tap root going down deep for ground water, and a film of surface roots, as if to gather moisture from dew. Very curious are the plants (mostly Proteas) in which pollination is effected by birds instead of insects; not by birds of the humming type but by perching birds, and as if to meet them the flowers are turned backward from the end of a twig toward the branch. While the gums (Eucalyptus) and wattles (Acacias) have been beneficially introduced in great number from Australia, the prickly pear (Opuntia) from America has become a pest, even causing the abandonment of certain farms.

—W. M. Davis in *Boston Evening Transcript.*

THE FUNCTION OF THE SCHOOL EXCURSION

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I.—The General Problem

IN the choice of the lines of activity to be retained in the curriculum, the question of relative values predominates. The consideration of the general problem of the excursion, then, will relate itself to the question, How fully does it lend itself to the ends and aims of education? Briefly stated, some of its main values are,—(1) That it deals with processes and products at first-hand, giving a basis of experience and therefore more participation on the part of the pupil. (2) It is vital and interesting because the pupil is brought not merely to the object but *into* it. (3) It gives motive for different phases of work to be utilized in many studies. (4) In the end it is true economy as it gives a reality to the subject in hand which much more time spent reading *about* these things could not give, and (5) not the least valuable is the social side which increases the desirable relations between the teacher and pupil and between the pupils themselves.

These values have long been recognized by the German and English schools and some governments, notably Switzerland and Japan, have gone so far as annually to appropriate definite amounts to be expended on excursions. It is interesting to note that as far back as Commenius the excursion was advocated along many different lines. He says to the pupil,—"Come on, let us go forth into the open air. There you shall view whatsoever God produced from the beginning and doth yet affect by Nature. Afterward we will go into *towns, shops, schools,* where you shall see how men do both apply those divine works to their uses and also instruct themselves in arts, manners and tongues. Then we will enter into houses, courts and palaces, to see in what manner communities of men are governed. At last we will visit temples where you shall observe how diversely mortals seek to worship their creator."

Excursions differ very widely according to the bearing each one has upon the rest of the school work. Most of them may be classed as special excursions, where certain lines are laid out and followed to the exclusion of many other things by the way. The undifferentiated excursion is often very fruitful. Here many lines may be touched upon with the emphasis upon those in which most interest is developed at the time. Then there is the free excursion, ramble or cross country walk, where exercise and the social side predominate.

II. CONCRETE EXAMPLES

Some of these values will be clearer after the following concrete examples: I. The trip to Briarcliff Dairy Farm with the sixth grade. Briarcliff was chosen from the subject-matter side as the most typical industry of New York state available for inspection, and it formed the nucleus of the work on industries of the state which were to be studied in the geography. On the other hand, we found the children interested in the products of the dairy because they come into such immediate contact with the milk and its products, although most of them were very ignorant as to the relations between the grass in the meadow and the milk in the bottle at the door. Before the trip, a survey of the important industries of the state was taken and the problems of our milk supply begun in the geography and cooking. Here, as is usually the case, some important results of the trip preceded it as the study borrowed vitality from the coming event because the pupils felt its necessity.

The day on the farm was full of live experiences. From the train, the children discovered many evidences of important industries by the way. At the dairy we followed the course of the milk, brought from the barn, saw how it is put through the strainers and into the large tank by means of which eight bottles are rapidly filled at once, saw the bottles capped, packed in ice and placed in the refrigerator car on the track at the door, ready for the trip to the city. The washing and sterilizing of the bottles and the care to keep everything clean were emphasized. The processes of separating the cream and making of butter were followed up. Then the care of the cows in the pasture and the barn and the special care of the calves showed the necessity for hygiene among the animals.

The mathematics work was especially valuable in giving the children physical concepts of area in which the teachers gladly participated. Naturally, the ideas of an acre were erroneous. Four pupils were asked to imagine an acre and to place themselves on its four corners. Measurement showed this was four rods on a side or one-tenth of an actual acre. Then one side of a real acre, ten by sixteen rods, was paced off and measured. The other side was estimated by four or five, each of them being several rods out of the way. One of the pupils was only one rod short on the sixteen rod side. We found afterward that this was undoubtedly due to the fact that the boy had lived all summer near a playground exactly one acre in size and he had a muscular feeling of an acre. Then one side of the acre was marked off by sixteen pupils, each one representing a rod. Here was a physical demonstration of area which we are sure the children will carry with them.

Among the most important of the after-results are the following,—The children had a first-hand experience with processes which before were mainly words, thus demonstrating to them what is back of words and leaving them better equipped to interpret other industries. In the geography, this made a nucleus for the study of the industries of the state, leading as it did to its larger agricultural industries and then to its minerals and topography. The written-work dealt with "What we saw on the way to Briarcliff," "The journey of the milk in the dairy," "How the milk is brought to the city," "Suggestions for building a dairy," and maps of the dairy regions of New York were made. The cooking for nearly two months received direct vital help from this excursion. The pupils went on the trip looking to see what precautions are used to keep milk clean and sweet. After the trip experiments were made to see which keeps sweet longer that which is sterilized or that which is not; that which is cool or that which is not; and that which is clean or not clean. The products of the milk, different methods of making butter and cheese were also studied. Then followed the topic of cleanliness; dirt in the household, kinds, source and remedy.

In the mathematics, work with distance, area, fencing and drawing to scale followed the field work.

The English at this time was especially alive, having its roots in the real experiences at the farm. Much interest centered about the conversations, the main motives being to tell those who did not go and to prepare records for others to be told in Assembly and at the coming Exhibit. Then the girls gave to the boys their experience in cooking. Letters were written to the proprietors of the farm thanking them for their courtesy, and the school photographs taken on the trip were classified and named.

The cost of this excursion was sixty cents per pupil.

The excursion of the third grade to Englewood, N. J., a little over a year ago shows how a trip may form the backbone for the work of the entire Fall. Preceding the trip, the story of Robinson Crusoe to the point where he begins a fortification was told the children. The following points were developed,—1. Crusoe's use of wax brought out a discussion of substances used for candles and a desire to make some for Christmas. 2. The fortification led to plans for a play fortification, estimation of number and size of sticks needed, and plan to observe ferry piles as suggesting size of actual piles. 3. In the Nature Study the distribution of seeds was taken up and the pupils wished to gather some. The study of corn and the aspect of the country in Autumn led to a desire to see them and to identify the birds and animals. The purposes of the coming excursion were told the children;—To pick bayberries for candles, To gather sticks for Robinson Crusoe's fortification, To see piles at the ferry and get an idea of his use of logs. The children added other purposes,—To gather seeds for the collection, see cornfield and brook, birds' nests and birds and animals in which they were interested.

On the excursion practically all of these aims were accomplished and several more. The weeks following yielded abundant material. In the English, compositions, words for songs, and spelling lessons,—music, original songs, individual and class,—manual work, preparation of sticks and making of sieves for straining the wax,—Art, sea-gulls sketched and candlesticks modeled,—Mathematics, weights and measures,—Nature Study, seeds and birds,—Additional work, the making of bayberry candles and apple-jelly, made from material gathered, were used at a luncheon for the second grade. The influence of this went still further, for the children saved their money at Thanksgiving time, bought apples and made jelly and sent it to the hospital.

III. NEW YORK CITY AS AN EXCURSION CENTER

The opportunities for excursions in New York and vicinity are exceptional and we ought to be familiar with those most available and worth while.

For Nature Study, the proximity to Central Park allows us many informal walks as well as chances to study birds and squirrels, the sheep in the pasture, the animals of the Zoo, the trees, leaves and seeds, seasonal work in the open and the weather records at the Arsenal, and evidences of glaciation, weathering, etc. To carry these lines further, we are very convenient to the country of New Jersey, New York, Long Island, etc., where woods and fields, brook, and seashore invite us to all kinds of botany, zoology and geography. When the pupils are interested in the story of the formation of the earth, we can find about us unusual evidences of different stages of its existence in the old and more recent rocks of Manhattan and vicinity and the interesting changes that have taken place since their formation by reason of vulcanism, weathering, glacial action, etc.

In numerous lines of the school work, the museums furnish an inexhaustible field. Their usefulness is increased many fold by the co-operative spirit of those in charge. They furnish guides for classes, set aside the lecture-room with stereopticon or material and someone to explain it. Materials for school collections are often donated. At the American Museum of Natural History we find innumerable fields for industrial and natural history work. Here, as well as at the Aquarium and the Zoological Park, the environment of different groups of animals is reproduced very accurately, from the nesting place of the robin in the blossoming apple-tree to the haunts of the bison and the deer. At Bronx Park are the Botanical Gardens, the Conservatory and the Museum, with their out-door and in-door botany, and the industrial side of plant life, such as different stages in the growth and manufacture of cotton, flax, turpentine, medicines, etc.

The Children's Museum in Brooklyn is filling a need for interesting natural history material adapted for the child's use, arranged in an attractive manner with a library of collateral reading. The material is studied at the museum and some of it is loaned to the schools. It is not necessary to do more than suggest the possibilities at the Metropolitan Museum of Art.

Our work along industrial lines has been aided and will be more helped by excursions to see the inside of industrial life. Nowhere in the world are better opportunities to enter into the spirit of commerce as shown in the incessant activity in our harbor where we find so many varieties of vessels leaving their cargoes of freight and humanity, or preparing for their long journeys to different parts of the world. We have opportunities to enter into the activities of flour mills, grain elevators, silk factories, sugar refineries, potteries, cracker factories, and this list might be continued indefinitely.

Most of us agree that the theory of excursions is based upon sound psychology. We do admit, however, that we have not begun to use the opportunities around us on every hand. If education is to rest upon experience, if we are to train pupils in the realities of life, must we not utilize this real side of our curriculum, and help the pupil to enter into the life about him by contact with its realities?

GEOGRAPHY AND THE OTHER SCIENCES

Geography is the mother of all the sciences, and is still indespensable to most sciences. The history of its study goes back two thousand years. The astronomy of the ancients was mathematical geography, and nothing more. Geology became a science in the end of the eighteenth century. It extended a knowledge of physical geography over pre-historic times. Geology and geography overlap each other: and the true distinction seems to be that the geographer contemplates the present in the light of the changes that have taken place in the past, while the geologist studies the past in the light of the changes that are taking place in the present. History, as we all know, is another science which must be alike halt and blind without the aid of geography.

From The Scope and Uses of Geography, by C. R. Markham, *The Geographical Journal, December,* 1905.

EDITORIAL

STANDARDS IN SCHOOL GEOGRAPHY WORK

Teachers of geography in elementary or secondary schools often find it extremely difficult to hold students to a standard of work as high as would be expected in most other school subjects. To measure a pupil's efficiency in the subject by comparing his expressed ideas with the formal phrases of a text-book is to be unfair to the thoughtful pupil and to reduce the subject to mere memorizing, thus weakening its value as a contribution to a child's training. To read into a pupil's poor statements expressed in an individual way, the truth that he ought to have gained, is easy, and a recitation is often classed as good because the desired knowledge seems to be there though the pupil has not shown exactness, clearness or care in classifying his points and expressing results he has gained. It is much easier therefore to mark pupils' recitations when the questions are introduced by "where" than it is if "why" or "what" is the keyword. It is perhaps for this reason that formal state examinations in so many places are largely information questions to test a child's knowledge of "sailor geography."

In physical geography it is particularly hard to measure a pupil's results by comparison with a stereotyped standard. This is by no means to be desired for stereotyped statements of facts may not indicate any real knowledge of the subject. Hence the necessity that teachers, who are working to make their pupils think, should measure their pupils' progress in accordance with a definite standard. Each teacher, in all work in geography where reasoning is required, should have clearly in mind two things—the essential points or individual parts in the problem, and the relations between these points that must be brought out. Every pupil should be measured by this standard and should be carefully trained to meet it. Indefinite, incomplete unrelated answers should not be accepted any more than they would be in physics, chemistry or history.

If geography is ever to advance it must be because the standard of efficiency is constantly being raised and because what has been marked good under old standards is no longer acceptable under modern standards. Such standards are bound to come as a result of the increasing better learning of teachers of geography, of the improved text-books and better organized courses of study, all of which are so much more common now than they were ten or even five years ago.

The authorities responsible for the general plan of school work should see to it therefore that they help the cause along by aiding the teachers and not counteract the influences of the advancing and efficient teachers. For state authorities to accept in their formal examinations results that no careful teacher would accept in a class-room is to lower the standard of efficiency and to weaken the teacher and the subject in the eyes of the pupils and the local school boards.

We have recently seen some published examination answers to a set of state papers in physical geography in which the results in certain questions were given a high relative value in the paper as a whole, when from the standpoint of accuracy of fact these answers hardly contained a glimmer of truth. To ask a pupil to "treat the subject of tides" for instance is to invite an indefinite unsatisfactory answer. To accept the following answer as satisfactory, as was evidently done in the case in mind, is to accept misinformation and confusion of ideas in place of a few well-ordered clear-cut replies such as ought to be the approved result.

"The tides are an incoming of the water every morning and evening. They are due to the curvature of the earth's surface. They seem to be large waves or water that is higher than the water in front and wash upon the shore at a greater distance than the water does at other times. The incoming at outgoing of the tides in the large sea ports and all along the sea coasts is watched for by the people. And ships that are loaded with cargoes are or wait until the out-going of the tide in order to help them out of the harbors with their loads. The people always be careful so as not to be within the tidal limit when it is in or about time for the tide to come in. The tides sometimes reach quite a ways upon the land and wash things away and at other times things are left. When the tide is coming in you can always tell as it is a great mountain of water and there is a roar of waters heard for some distance."

If such standards are still acceptable how can we expect good teachers to combine to do good work and when will geography cease to be considered one of the weakest secondary school sciences? Examining boards ought to realize that high standards, attainable by the best, ought to be rigidly held before the poor students and teachers as a goal to be reached, if they would be rewarded for their hard work. Poor standards ought not to be accepted and if examining officers do not know how to ask questions to secure good results, according to modern standards, they ought to learn from studying the work of the best teachers. This standard should be raised slowly but constantly and should keep pace with the improved standards demanded in teachers, in texts, in courses of study and in material equipment.

REVIEW

A LABORATORY MANUAL IN PHYSICAL GEOGRAPHY: By Frank W. Darling. Exercises 55. Chicago and Boston; Atkinson, Mentzer and Grover, 1905.

A revised and enlarged edition of Mr. Frank W. Darling's Laboratory Manual in Physical Geography published two years ago has appeared under the title noted above.

The first manual was distinctly valuable but the new volume is still better. It outlines a logical course making good training possible even in the hands of a comparatively inexperienced teacher and offers, too, many suggestions that those familiar with the field may profitably adopt.

The fifty-five exercises which comprise the volume are apportioned as follows among the various departments of the subject. The sequence of topics is also indicated:—

The Earth as a Globe	8
The Atmosphere	21
Life Distribution	1
The Ocean	2
The Lands	23

While the more important subjects should receive the greater share of attention the work would be materially strengthened throughout by a more impartial division. A greater emphasis of those topics superficially treated would make it possible to base the entire study of the subject on the laboratory, the most desirable method except where field work may be introduced, and would also permit a choice of exercises on the part of the teacher.

As the figures quoted above would indicate, the treatment of the atmosphere and the lands is decidedly stronger than that of the other topics.

The order of the subjects treated is on the whole logical though "Life Distribution" should follow, not precede "The Ocean" and "The Lands." Shore lines, too, are out of place before the study of the other great land forms.

The questions are generally excellent in that they are clearly expressed, searching in character and that they lead logically to the principle to be deduced.

The manual contains good relief maps of the various continents, a supply of outline maps of the continents as well as of the world and a map showing the life regions of the world in colors. Space is reserved at the end of the volume for a record of the work, note paper and section paper also being furnished. The manual is probably the most complete in the field and will certainly meet with the success to which the thought and care evident in its production entitle it. C. B. K.

RECENT PUBLICATIONS

LABORATORY AND FIELD EXERCISES IN PHYSICAL GEOGRAPHY. By Gilbert H. Trafton, pp. vi+90. Ginn & Co., Boston, 1905.

A simple and rational series of exercises in physical geography with the major emphasis, as is right, upon the land and the atmosphere. Definite and practical, excellent for classes in first years of secondary course. An appendix includes suggestions as to apparatus and gives references to the literature available on laboratory work in physical geography.

GEOGRAPHY OF SCIENCE. Specially prepared from the Tarr & McMurry series of geographies, to meet the requirements of the seventh year in the public schools of the city of New York. pp. vi+249. The Macmillan Company, New York, 1905.

A book with an unintelligible title prepared for the purpose indicated in the sub-title. Includes Geography of North America, General Geography, Europe, The United States compared with other countries, in the order given.

ECONOMIC GEOLOGY OF THE UNITED STATES. By Heinrich Ries, pp. xx+435. The Macmillan Company, 1905.

An authoritative text-book of Economic Geology, valuable for reference in commercial geography. Well illustrated and accompanied by an excellent index. To be reviewed later.

EARLY WESTERN TRAVELS. 1748-1846. Edited by Reuben G. Thwaites. Vol. XX including Part II of Gregg's Commerce of the Prairies, pp. 356. The Arthur H. Clark Company, Cleveland, Ohio, 1905.

This volume like its predecessor, noted last month, is particularly interesting on account of its faithful accounts of life in Mexico and New Mexico in the Thirties. The chapters on the animals and Indians on the prairies are especially valuable. Gregg's Commerce of the Prairies is considered by experts one of the most valuable reference volumes on the Southwest.

ARTICLES IN CURRENT GEOGRAPHIC MAGAZINES

AMERICAN SAMOA, Frank T. Chambers. *American Geographical Society Bulletin.* November.

An interesting illustrated descriptive account of Samoa and the life of the people.

THE RAILWAYS IN NEWFOUNDLAND, C. M. Skinner. *American Geographical Society Bulletin,* November.

An illustrated account of the little known region traversed by the new railroad across Newfoundland. Brings out many interesting points of a region generally considered as merely a fishing center.

THE TEACHING OF GEOGRAPHY IN THE SCHOOLS OF CUBA. *Scottish Geographical Magazine,* November.

Outline of the geography course in the common schools of Cuba. Interesting illustration of constant emphasis of home country.

THE NATURAL REGIONS OF THE WORLD. A. J. Herbertson. *The Geographical Teacher.* Autumn number.

Considers the divisions of the world in natural regions secondary to "unity of configuration, climate and vegetation." Most interesting tentative suggestions as to ways of dividing the world for teaching. Illustrated by maps.

NOTES

THE RAILWAYS IN NEWFOUNDLAND.—With little lift of grade, and following the considerable stream known as Harry's Brook, we strike the Humber, one of the rivers that so nearly split Newfoundland into an archipelago, for if it were sunk a few yards deeper into the sea it would be nine islands instead of one, all with the northeast-southwest axis. The Humber, broad in its lower reaches, narrows till we find its black torrent pouring westward through a gorge with tawny precipices overhanging a thousand feet above. We cross its tributary, Grand Lake, 56 miles long, at its foot, and then begins the climb toward the great barrens that roof the island and are feeding-grounds for caribou, which hunters are slaughtering by thousands, and which, like the human aborigines, the Beothuks, are doomed to extermination. The forest we are leaving, and that clothes much of the lower country, is of spruce, pine, fir, and tamarack; but there are fine specimens of birch, some maple, and the deep tangles of elder and various shrubs and field growths of our own country betoken fertility whenever the land shall be claimed for agriculture or for ranching. The wood thins presently, discovering what might be taken for clearings; these spaces widen to fields; and at the fall of night we rise into the vast, cold solitudes where granite *tolts,* or peaks crouch along the distance, lifting their heads toward the sunset; then the scene fades with an impression of immensity and the northern lights begin to dance.

These barrens are as impressive as the western plains, and resemble them at first glance; yet they differ, except in superficies. The plains are dry; the barrens soggy, and threaded by a thousand rills. The plains are stony and dusty; the barrens, the boulders strewn here and there are deceptively like pasture. The "moss," as they are also called, is a thick carpet, the woody stems of Indian tea and "goold-widdy" forming a warp, and grass, reeds, and reindeer-moss the woof. This carpet has been thickening for centuries, and although the surface appears dry and invites to rambles, you sink in it to the ankles, and sometimes to the knees. I am told that in a few places it is six feet deep. It holds the moisture which is visited on the island in rains and fogs, and it collects in unseen hollows where a surface growth of blue flag denotes its presence. One needs rubber boots in exploring the barrens, and he finds advantage in following the elk tracks, which avoid many pitfalls that the moss conceals. Yet there is little danger from swamp or quicksand.

The crest of the island, near its center, is marked by a series of tolts, of which the Topsails and Hodges (2,200 feet) are conspicuous from the railroad, and, in crossing the divide at a height of 1,800 feet or so, one is apt to see white drifts beside the track, in the shadow of the snow fences, as late as July. For, although the cold is less intense than on our Western ranges, snow falls heavily in winter and traffic is stopped for weeks at a time. Gruesome tales are told of the sufferings of passengers when stalled fifty miles from a settlement.

At Dawe, which needs a microscope to discover it as a town, we reach the Exploits River, pouring from its sources in the Annieopsquolch Mountains, with many leaps and much chafing of its hilly shores, toward a bay filled with islands. We follow 40 of the 200 miles of this largest of the Newfoundland streams through wilderness, still unpeopled, then over a brief rise to the valley of the Gander, the streams of this country being often separated by the thinnest of partitions. And descending to these large, calm reaches, which are in marked contrast to the romantic cañon of the Humber, we still find the land clothed with primeval forest; but the hum of the saw-mill is heard in the land, and a tract half as large as New Jersey will be deforested if the Harmsworth pulp concession becomes effective, to the detriment of the soil and springs—a circumstance overlooked by the people in their hope of gain from the industrial development. There is hardly a break in the wilderness between the east coast and the west for agricultural or grazing purposes, and few present occasions for an interior village, except at the granite quarry near the Topsails. Nor need we look for an immediate settlement if the fisheries continue to prosper. They engage nearly a third of all the Newfoundlanders and represent almost the adult male population; still, there are 2,500 farmers, with an average of 34 acres apiece, and they raise cattle, sheep, hogs, and poultry; so that the agricultural idea is implanted, and some day there will be withdrawal from the bleak, rough coast, with its icy besetment, and devotion to less heroic toil than the pursuit of cod and whales. Here along the Gander, with its fertile alluvium, is room for a million homes.—*American Geographical Society Bulletin, November,* 1905.

FOREIGN COMMERCE OF THE PRINCIPAL PORTS OF THE WORLD.—The following table, compiled in the Bureau of Statistics, Department of

Commerce and Labor of the United States, from latest available official sources, shows the foreign trade of the principal seaports of the world. In the case of the United States ports both the land and sea-borne commerce is given; in the case of some foreign ports the sea-borne commerce only is stated. The value of the transit trade, whenever available, has been included.

Value of commerce of principal ports of the world.

PORTS.	Year	Imports.	Exports	TOTAL COMMERCE
EUROPE.				
Great Britain.				
London, including Queensborough	1903	$842,547,306	$462,206,875	$1,304,754,181
Liverpool	1903	627,915,453	557,598,986	1,185,514,439
Hull	1903	158,653,074	97,597,239	256,250,313
Glasgow	1903	70,119,734	103,394,005	173,513,739
Southampton	1903	76,599,659	70,990,449	147,590,108
Manchester, including Runcorn	1903	98,688,995	45,244,167	143,933,162
Harwich	1903	94,433,941	22,810,512	117,244,453
Grimsby	1903	49,387,339	49,877,523	99,264,862
Leith	1903	67,095,366	13,482,299	80,577,665
Tyne ports	1903	48,916,122	37,346,699	86,262,821
Bristol	1903	62,052,849	10,486,933	72,539,782
Cardiff	1903	20,981,470	50,362,868	71,347,338
Germany.				
Hamburg	1903	[a]550,751,000	[a]430,765,000	[a]981,516,000
Bremen	1903	[a]198,518,000	[a]93,939,000	[a]292,457,000
France.				
Marseilles	1903	248,869,000	182,683,000	431,552,000
Havre	1903	213,619,000	150,524,000	364,143,000
Dunkirk	1903	118,639,000	25,381,000	144,020,000
Bordeaux	1903	48,850,000	60,046,000	108,896,000
Austria-Hungary.				
Trieste	1903	60,353,000	40,642,000	100,995,000
Belgium.				
Antwerp	1903	388,174,000	347,940,000	736,114,000
Russia.				
St. Petersburg	1902	50,871,000	30,336,000	81,207,000
Odessa	1902	31,779,000	59,693,000	91,472,000
Riga	1902	19,311,000	43,226,000	62,537,000
Spain.				
Barcelona	1903	60,728,000	21,870,000	82,598,000
Bilbao	1903	15,109,000	16,431,000	31,540,000
AMERICA.				
United States.[b]				
New York, N. Y	1904	600,171,033	506,808,013	1,106,979,046
New Orleans, La	1904	34,036,516	148,595,103	182,631,619
Boston and Charlestown, Mass	1904	80,657,697	89,845,772	170,503,469

Galveston, Tex.	1904	1,847,646	145,316,457	147,164,103
Philadelphia, Pa.	1904	53,800,106	71,393,254	125,283,360
Baltimore, Md.	1904	20,345,788	82,836,164	103,181,952
San Francisco, Cal.	1904	37,542,978	32,547,181	70,090,159
Savannah, Ga.	1904	924,061	53,770,382	54,694,443
Puget Sound, Wash.	1904	11,285,096	22,729,580	34,014,676
Canada.				
Montreal	1904	80,561,275	67,844,729	148,406,004
Argentine Republic.				
Buenos Aires	1903	107,494,000	109,803,000	217,297,000
Brazil.				
Santos	1902	21,857,000	67,420,000	89,277,000
Rio de Janeiro	1902	49,500,000	32,515,000	82,015,000
Chile.				
Valparaiso	1903	29,247,000	4,440,000	33,687,000
ASIA.				
China.				
Shanghai	1903	118,989,000	69,150,000	188,139,000

a By sea only. *b* Year ending June 30.

THE SNOW-LINE.—An imaginary line joining the heights above which occurs perpetual snow is called the *snow-line or limit of perpetual snow*. Below the line, the heat of the sun is sufficient to melt all the snow that falls. The following is the height of the snow-line at various places:—

	Latitude	Height of Snow Line
Quito	0°	16,000 feet
South side of Himalayas	28 N.	16,000 "
North side of Himalayas	29 N.	20,000 "
Sierra Nevada	37 N.	11,000 "
North side of Alps	46 N.	8,000 "
South side of Alps	46 N.	9,000 "
North Cape	71 N.	2,000 "
Spitzbergen	78 N.	Near sea-level.

DO WE NEED A TEXT AT ALL?—The belief is held by many educationists that if our grade teachers were properly equipped in training and scholarship, there would be no place for the text-book. We have set up, in our pedagogical shrine, an ideal teacher, of high conceptions, high attainments, and high mettle, to whom we conceive the text-book merely as an impediment, prescribed by an undiscerning superintendent.

That this is a dangerous fallacy, however, it requires but a glance over the situation to show. Not all initiative is dependable, and not all the roads of individuality lead to Rome. Our profession is full of people with crochets and hobbies, and perhaps you and I are among the number. Too many of us poke hairpins into the course of study, to see the wheels go round, or possibly to make them turn the other way. Occasionally there arises one who can blaze a new trail, but there are not many. For the rank and file of us tradition is by far the safest working platform; and with it under our feet we in the long run render our best service. So far as geography-teaching, at least, is concerned, no scheme superseding the text-book has ever been offered which has proven, in the estimate of schoolmen at large, acceptably inclusive and exclusive.

The text-book appears needful also for a diametrically opposite reason. It not only answers as a corrective against crochets and distorted perspective, but, on the other hand, it sustains, in a fair degree of continuity, the work of the great army of teachers who are troubled neither with crochets nor perspective. In a word, it is the only safeguard we have against the chaos of genius on the one hand, and the barren wastes of indifference, on the other. Those upon whom devolves the task of shaping the material and methods of elementary teaching must ever be conscious that they are purveyors, not to a few geniuses and zealots, but to a great body of average toilers, tolerably alike, and numbering, in our own country, nearly four hundred thousand head. Viewed in this practical light, the text-book, be its failings what they may, appears as a veritable life-buoy in the deep.—*From a Consideration of Geography Texts, Elementary School Teacher, October,* 1905.

THE RESULTS TO BE GAINED FROM THE STUDY OF GEOGRAPHY.—There is so much variety in the mental make-up of boys and girls that the study of geography in elementary schools ought not to be expected, even under ideal conditions, to lead to the same results in all cases; but a well-taught course in geography should lead an intelligent pupil toward if not to the following results:

1. An intelligent desire and a growing capacity to learn more about the world and its inhabitants; and with this, an understanding of the relative value of elementary text-books as mere outlines and summaries for beginners; of hand-books, treatises and atlases as works of reference; and of books of travel, and reports of scientific surveys and expeditions, and large-scale topographical maps as original sources of information.

2. Some practice in the use of hand-books, atlases, and original sources as a beginning of the excellent habit of looking up things; and the seeds of a liking for the enlightening recreation of following the world's geographical progress as recorded in reports and narratives of the more important explorations.

3. Such an understanding of the simpler principles of inorganic environment and organic response—of physiography and ontography—as shall

lead to an intelligent appreciation of new information, particularly in its human and economic relations.

4. Some observational acquaintance with local features, both physiographic and ontographic, sufficient to give conviction of the reality of unseen things, of which verbal descriptions or conventional graphic representations are given in books and maps; still better if local observation has been carried far enough to give ability to derive intelligent enjoyment from the opportunities of travel.

5. Some practice in the presentation of oral, written and graphic reports on facts seen in the field or studied in books or maps.

6. A beginning at least of the realization of the pupil's own place in the world and of his own part in the world's work.

7. Subordinate to all the above, as means are subordinate to the end, the names and locations of many places and peoples studied in their mutual relations and as examples of classes and principles, not as isolated, disconnected facts, and learned rather by use than by memory.

8. (In common with the results of other studies.) A disciplined adolescent mind, ready to make active attack upon life's problems.—*W. M. Davis.*

COFFEE, ITS ORIGIN AND PROPAGATION, ITS INTRODUCTION AND CULTIVATION IN COSTA RICA.—Among the varied agricultural products which at present constitute the leading features of universal commerce, not one presents an instance of such rapid and extensive development as coffee.

The dissemination of knowledge of the useful qualities of the product is due to the Turks, and the original extension of its cultivation to the Dutch. The aromatic grain does not appear to have been thoroughly appreciated on its native soil, but on its transfer to foreign regions it arrived at a condition of greatness and prosperity. Indeed, so vast is the territorial extent at present devoted to its culture, and so many millions of laborers are employed thereon, while such enormous sums of money are invested in the industry, that coffee rightly takes first rank among the alimentary products of agriculture.

The most generally accepted account of the origin of the coffee plant places it as a product native to Asia and Africa, on the shores of the Red Sea, but opinion is divided as to the locality in which its utility was first demonstrated. Thus, while according to some authorities, the use of coffee was known in Abyssinia from the earliest times, others assert that it was introduced into that country about 900 years before the Christian era by certain half-civilized tribes of Upper Ethiopia. This latter seems to be admitted as the more probable statement, but as is the case with other facts, the true history is lost in the obscurity of years.

The name is undoubtedly derived from Kaffa, a place in southern Abyssinia, where coffee grew wild in great profusion on the slopes of the mountains, and where, at the beginning of the fifteenth century, a beverage known as *cobo, cahove, coava,* or *cave* was prepared from a cultivated plant. Its use was also known in Arabia as well. From this point, knowledge of it extended to Constantinople and to the rest of Turkey, passing thence to Persia, and, by way of Cairo, throughout Egypt, during the sixteenth century. The first person attracting European attention to the plant was Rauwolf, who had known it in Aleppo, Syria, while the first botanical description of it was made by Prosper Alpinus in 1582. The Venetians first introduced it in that part of the world in 1624, and within twenty years it had become the universal beverage throughout southern Italy. England, which is now the great center of coffee trading, recognized its importance in 1650, and two years later opened public coffee houses in the Kingdom. Daniel Edwards, a Smyrna merchant, first imported it into the London market and a Greek by the name of Pasqua was given in charge of the coffee house. In France, coffee was introduced at the court of Louis XIV by an ambassador of Mohammed IV, and in 1669 and 1672 public coffee houses were opened in Marseilles and Paris, respectively. The first coffee house in Vienna, Austria, was opened in 1683, and in Berlin, Prussia, in 1711.

Attempts to extend the culture of coffee plantations were first made in 1650, when the Dutch carried small plants from Moca to the East Indies and, according to some authorities, planted them on the island of Bourbon, though others assert that Batavia was the site of the first planting. The results being found satisfactory, similar cultures were made on the island of Java, with good results. The plant was also carried by the Dutch to Amsterdam, whence, in 1714, a coffee tree was sent to Louis XIV, who had it cared for in the conservatories of the royal garden. It is said that from this plant, the first seeds were transported to America, and that it formed the basis of coffee growing in the West Indies. However, certain references indicate that in 1715 coffee was known in Santo Domingo and Haiti and that a Captain Declieux brought two plants to America in 1720, introducing it into the French colonies. It is also stated that the island of Martinique, in 1726, received a small coffee plant, from which point the seeds quickly spread to Santo Domingo, Guadeloupe, and Cayenne. In whatever manner it was accomplished, however, it is evident that the growing of coffee was known in America during the first quarter of the eighteenth century.

It was carried to Brazil from French Guiana in 1723, and the first efforts toward its propagation in the Province of Para did not give satisfactory results, as neither the soil nor climate of that section were favorable, but about fifty years later a Franciscan monk established a small plantation in the Province of Rio de Janeiro, and thence its culture extended to San Pablo, Minas Geraes, and Espiritu Santo, so that at present all the coffee of Brazil, which forms half the world's crop, is grown in these regions.

The plant was introduced into Cuba by Don Jose Antonio Gelabert in 1748, the seed having been carried from Santo Domingo. The results were primarily satisfactory, but its culture afterwards completely declined. Venezuela commenced coffee growing in 1774, owing to the initiative of a priest, Jose Antonio Mohedano, near Caracas. The first exportations consisted of 233 quintals and were made from the port of La Guaira in 1789. Mexico began this culture in 1802, and Colombia, at a later date.

Coffee growing was introduced into Costa Rica in 1796 by Don Francisco Xavier Navarro, a Spaniard, who transported the plant from Havana and planted it in the garden of his house at Cartago. As the seeds were obtainable from the plants, Señor Navarro distributed them, and in a short time coffee plants were growing in many of the gardens of the town. Thus the knowledge of the plant was disseminated, though at first, and in fact throughout the first decade of the eighteenth century, it was looked upon as an object of curiosity. The first two plants developed into large trees and were in existence until within the last twenty years, but have now entirely disappeared, leaving only a memory.

From Cartago, Father José Velarde carried the plant to San José in 1819, when the cultivation of coffee in Costa Rica really began, the credit being due to this priest. Thence the knowledge of the plant spread to the other Central American States. The Costa Ricans early recognized the importance of coffee as an article of commerce and developed its culture on an equal plane with sugar cane, cotton, cacao, and other products adapted to the soil of the country. With this object the Municipal Council of Cartago issued various regulations in 1821, the same being effected by the Government Council, which succeeded the Colonial Government in the years subsequent to the declaration of independence. Upon the establishment of the Federation of Central America, Don Juan Mora, First Chief Executive of Costa Rica, in 1825, excepted coffee among other articles from the onerous tax of 10 per cent., thus stimulating its cultivation so that within two years it had become an important product in that section of the Republic. Later, during the second administration of Señor Mora, by a decree of the National Assembly, free grants of public lands were made for the growing of coffee plantations or for tracts on which, during a term of five years, such plantations should be made; furthermore, double grants were made to such persons who should encourage the growing of edible plants.

Owing to these measures, a very short time elapsed before Costa Rican coffee, as a native plant, became an article of commerce, and in 1832, George Stipell, a German merchant of San José, made the first shipment of the article, sending the first bagfuls of this valuable produce to Chile. The coffee of Costa Rica immediately gained favor and the extent of native plantations increased in proportion to the demand in foreign markets.

Later, in 1840, President Don Braulio Carrillo, authorized the sale of the municipal lands of Las Pavas, near San José, with the express conditions that they should be planted in coffee, according to the most improved methods, so that these plantations might serve as models. While the influence of such action was important, it did not, however, attain the value hoped for.

After the dissolution of the Federation of Central America and during the Government of Don Juan Rafael Mora, inaugurated in 1849, agriculture made great progress in Costa Rica, aided thereto by the development of public highways. The cultivation of coffee and sugar cane so absorbed the attention of the country that in 1861 the quantity of coffee exported amounted to 4,600,000 kilograms, notwithstanding the scarcity of labor and of capital, and in spite of the war against Walker in 1856 and 1857, the cholera, and the revolutions of 1859 and 1860.

Coffee growing continued to increase, and, in 1884, the product reached 18,500,000 kilograms, and although it has somewhat declined of late years (in spite of the great extension of lands adapted to its culture, as those of Turrialba, where the plant grows prodigally), this decline is due principally to the falling off in its price in foreign markets and to the scarcity of labor occasioned by the development of trade in other branches, among which (aside from gold exports, which were valued at $228,237 in 1903, and forest products, worth $156,782) may be cited cacao, with a crop of 80,532 kilograms of excellent quality, and bananas to the amount of 5,139,063 bunches.—*Monthly Bulletin, International Bureau of the American Republics,* October, 1904.

ALLIGATORS IN VENEZUELA.—Though but few alligator skins are sent abroad from here, it is not on account of scarcity of alligators. It is strange that nobody has taken up the hunting of these reptiles. They are here in the lakes and lagoons and rivers in untold numbers and of all sizes. The skins are well worth securing, and alligator oil brings a high price, being used for medical purposes. In the Rio de Oro and the Rio

Tarra I have seen thousands of large alligators which came up to deposit their eggs on the sand banks during the dry season. It is the same in all the hundreds of streams which flow into the lake of Maracaibo. Alligator hunting is fine sport, and, in my opinion, would be a paying business. *Consular Reports, October, 1904.*

THE HEIGHT OF MOUNT WHITNEY.—Mr. Henry Gannett informs us that the U. S. Geological Survey last summer ran a line of levels from the Pacific Coast by way of Los Angeles and Mohave and Owens Lake Valley to the summit of Mount Whitney, giving it a height of 14,499 feet. This entire line was double-rodded, and is doubtless accurate to within a foot. This appears to settle the much-disputed question of the height of this peak. It slightly exceeds in height any other mountain in the United States, outside of Alaska. Mount Rainier, in the State of Washington, was determined by 13 vertical angles to be 14,363 feet high; so that Mount Whitney surpasses it by more than 100 feet. It is also higher than the loftiest summit in Colorado. The determination of Mount Shasta by means of many vertical angles gives it a height of 14,380 feet.—*Bulletin, American Geographical Society.*

CHINA WILL HOLD MANCHURIA.—The new Chinese-Japanese treaty gives Japan only a slight foothold in Manchuria. According to its provisions the lease of the Kwantung Peninsula will expire in 1923, Japan will evacuate Manchuria within eighteen months; there will be garrisoned consulates at New Chwang, Mukden, Antung, Kirin, Chang-Chung and other places; the military notes issued by the Japanese are to be redeemed rapidly; and their military administration shall lapse with the evacuation.

After the foregoing has been accomplished China proposes to keep a permanent garrison of 100,000 troops in the Shinking, Kirin and Amur provinces of Manchuria. Japanese officers will be engaged to command the troops. European diplomatists are said to have been made anxious by China's recent great strides toward becoming a military power. Enormous financial sacrifices, estimated at $600,000,000, spread out over twenty years, are being made to create a force to hold China for the Chinese.

The imperial army some years hence will consist of 1,250,000 men. Every man will serve three years with the colors and six in the reserve. With the new year this trained army will have reached 400,000 men, all provided with magazine rifles, modern field guns and European equipment. The cost of the army will be $40,000,000 annually. China now has a million rifles on order and will eventually possess 300 modern batteries.—*The Search Light,* December 23, 1905.

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